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Robert L. Glicksman

George Washington University Law School, rglicksman@law.gwu.edu

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Dynamic Governance in Theory and Application, Part I

David L. Markell* and Robert L. Glicksman**

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* Steven M. Goldstein Professor of Law, Florida State University College of Law.

** J.B. & Maurice C. Shapiro Professor of Environmental Law, The George Washington University Law School. The authors thank Bill Andreen, Emily Hammond, Shi-Ling Hsu, Joel Mintz, Lee Paddock, Erin Ryan, J.B. Ruhl, Mark Seidenfeld, Hannah Wiseman, and Sam Wiseman for their helpful comments on earlier drafts. Sarah Logan Beasley (FSU Law 2016) and Stephanie Schwarz (FSU Law 2016) provided very helpful research assistance, as did Katie Miller, Assistant Director for ILL & Document Delivery, Florida State University College of Law Research Center.

Abstract

This article is the first of two that grapple with a central policy challenge facing the administrative state: how to govern in times of dynamic change, when challenges, and opportunities to address them, are both shifting rapidly. The article suggests that, conceptually, process design that is likely to produce effective regulatory governance requires attention to three key distinct but interrelated variables – the actors who are or should be involved in program implementation in different capacities, the mechanisms (legal and otherwise) available to promote good governance, and the tools available to advance desired results. To demonstrate the value of the conceptual framework that we introduce here, the article uses it to assess one agency’s ongoing experiment in transforming its approach to regulatory enforcement, the federal Environmental Protection Agency (EPA). It explores the reasons for EPA’s judgment that a dramatically altered regulatory landscape requires the agency to transform its enforcement strategies. It then analyzes what EPA has characterized as its new enforcement and compliance paradigm, which the agency calls Next Generation Compliance. The article demonstrates how use of our conceptual framework to systematically consider the roles of the relevant actors, mechanisms, and tools, individually and in combination with one another, helps to identify beneficial regulatory options that alternative frameworks like the one EPA has used in designing the Next Generation Compliance initiative may overlook. The companion article builds on this foundation by further documenting how our framework will help to promote more systematic regulatory design in situations in which policy makers believe that a transformation or a new paradigm is needed, such as the situation EPA faces in enforcing the environmental laws. Our analysis underscores the value of our three-pronged conceptual framework in areas that extend well beyond environmental regulation.

I. Introduction

“Change is constant in nature and society.”¹ In particular, “institutional change is constant and inevitable.”² Indeed, some have characterized the constancy and inevitability of change as “the organizing principle of democracy.”³ The unceasing nature of change poses challenges to governance regimes, including government regulatory programs. In some instances, the policymakers who created these programs built into them processes and standards for responding to changes in the scope or nature of the problems these programs are designed to address. In other instances, policymakers have not foreseen change, or at least have not foreseen the particular shifts in circumstances that confront government officials responsible for

¹ Moonhawk River Stone, *Approaching Critical Mass: An Exploration of the Role of Intersex Allies in Creating Positive Education, Advocacy and Change*, 12 CARDOZO J.L. & GENDER 353, 358 (2005); see also Steven Johnston Knopp, *More Change, and New Directions*, W. VA. LAW., March/April 2008, at 4 (“If there is one unchanging truth in the universe, it is that change is constant.”); Guyora Binder, *Representing Nazism: Advocacy and Identity at the Trial of Klaus Barbie*, 98 YALE L.J. 1321, 1383 (1989) (citing 1 SELECTED WORKS OF MAO TSE TUNG 341-42 (1967) (stability is ephemeral, change is constant). This insight is not new. See, e.g., WILLIAM SHAKESPEARE, THE SECOND PART OF KING HENRY THE FOURTH, act 3, sc. 1, lines 51–53 (“[H]ow chances mock/And changes fill the cup of alteration/With divers liquors!”).

² Michael Halberstam, *The Myth of “Conquered Provinces”: Probing the Extent of the VRA’s Encroachment on State and Local Autonomy*, 62 HASTINGS L.J. 923, 947-48 (2011).

³ Steven G. Gey, *Is Moral Relativism A Constitutional Command?*, 70 IND. L.J. 331, 368 (1995).

implementing the programs.⁴ In such instances, the risk that change will frustrate policymakers' goals is likely to increase, especially if it is abrupt or unprecedented.

This article grapples with this central and recurring policy challenge: how to structure and administer regulatory programs in times of dynamic change, when challenges, and opportunities to address them, are both shifting rapidly. We believe it is incontrovertible that regulatory design has the potential to facilitate or thwart policymakers' efforts to implement regulatory programs in the face of change in a manner consistent with programmatic goals identified by legislators.⁵ We further believe that the recent scholarly attention to the adaptability of legal regimes, and the use of *ex ante* vs. *ex post* decision making approaches, offers considerable insight concerning the issues policy makers and others need to consider in dynamic times.⁶

Our purpose in this article is to suggest a three-part conceptual framework (depicted in Figure 1 below) to assist policymakers seeking to design regulatory structures likely to produce effective governance in dynamic circumstances. The framework identifies as key regulatory design considerations the roles of each of the *actors* who are or should be involved in different capacities in administering the governance regime, the *mechanisms* (legal and otherwise) available to promote regulatory goals, and the *tools* available to policymakers and other stakeholders to advance desired results. Policymakers should be cognizant of the manner in which options for addressing each of these three variables are likely to affect the desired functioning of the other two. Thus, for example, a legal mechanism for advancing regulatory goals, such as the use of enforcement actions to induce compliance with regulatory standards, may work better if it is controlled by one actor or a combination of actors. Similarly, the availability of new regulatory tools may suggest the need for, or opportunities presented by, a shift in the roles played by the actors involved in implementing or affected by the program.⁷ A variety of literatures grapple with aspects of our framework, including "new governance" theory and various formulations of federalism theory (all of which focus on actors); literatures that

⁴ There may be considerable uncertainty about the adaptability of a legal regime to address new challenges. *See, e.g., Massachusetts v. EPA*, 549 U.S. 497 (2007) (holding that Congress intended to create an adaptable framework for responding to air pollution threats in the face of competing perspectives offered by different EPA General Counsels).

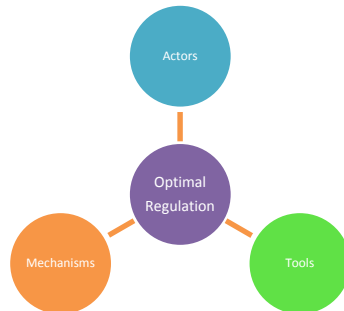
⁵ In *Massachusetts v. EPA*, for example, the Court concluded that Congress intended to delegate to EPA the authority to address particular forms of air pollution whose potential adverse impacts Congress was unaware of when it adopted the Clean Air Act. The case illustrates the capacity of a regulatory design crafted to accommodate change to give regulators the authority to forge ahead in new directions that were unanticipated at the time of program formation but that advance statutory goals.

⁶ There is an emerging literature on the appropriateness of adaptive management and on the use of *ex ante* vs. *ex post* decision making processes. *See, e.g.,* Robin Kundis Craig & J.B. Ruhl, *Designing Administrative Law for Adaptive Management*, 67 VAND. L. REV. 1 (2014). *See also* J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems – with Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373, 1374, 1375, 1376 (2011) (noting, more broadly, that scholars have considered the concepts of resilience and adaptive capacity in a range of disciplines and have "recently have begun to consider how these [concepts] might inform the design of laws for discrete legal application."). Professor Ruhl offers what he believes is the first effort to "synthesize resilience theory in a framework relevant to lawyers." *Id.* at 1375.

⁷ We demonstrate the value of this framework in both this article and a second article on dynamic governance, in which we engage in a thorough application of each of its components to the federal Environmental Protection Agency's effort to transform its approach to compliance and enforcement. *See* David L. Markell & Robert L. Glicksman, *Dynamic Governance in Theory and Application, Part II* (forthcoming).

focus on different mechanisms such as the use of rulemaking, permitting, and enforcement; and literatures that focus on tools.⁸ Ours is the first effort of which we are aware to offer a comprehensive framework that synthesizes these literatures in the context of dynamic governance.

Figure 1



There is, of course, an important threshold question: who should have the capacity to make the normative calls on whether and how to respond to change? Ideally, Congress, the most accountable policymaking body, in tandem with the President, would direct agency responses. Multiple factors make that outcome unrealistic, however, including the multiple vetogates in the legislative process,⁹ the legislative gridlock that has characterized recent legislative sessions,¹⁰ and the significant gap that often (and currently) exists between the policy agendas of Congress and the President. If Congress and the President fail to jointly take the bull by the horns through the adoption of legislation, decisions to effect transformations are left to the President acting unilaterally (such as by an executive order reorganizing agency structures) or agencies exercising delegated discretionary authority.¹¹ If agencies take on the task of anticipating or responding to change in the absence of such action by the elected branches of government, a further question is whether they can be held accountable for the choices they make. Agencies themselves can enhance their own accountability,¹² but the courts often provide the ultimate mechanism for ensuring that agency action conforms to legislative mandates and the rule of law when they resolve challenges to agency action.¹³

⁸ For discussion of each of these literatures and how they might influence policy choices relating to each of the three components of our dynamic governance framework, see Markell & Glicksman, *supra* note 7.

⁹ WILLIAM N. ESKRIDGE, JR., PHILIP P. FRICKEY, ELIZABETH GARRETT, *LEGISLATION AND STATUTORY INTERPRETATION* 79-81 (2d ed. 2006) (discussing vetogates).

¹⁰ See, e.g., Michael J. Teter, *Gridlock, Legislative Supremacy, and the Problem of Arbitrary Inaction*, 88 NOTRE DAME L. REV. 2217 (2013).

¹¹ See, e.g., Abbe R. Gluck, Anne Joseph O'Connell & Rosa Po, *Unorthodox Lawmaking, Unorthodox Rulemaking*, 115 COLUM. L. REV. 1789 (2015) (discussing unorthodox lawmaking strategies in response to partisan gridlock, among other factors).

¹² See Emily Hammond & David L. Markell, *Administrative Proxies for Judicial Review: Building Legitimacy from the Inside-Out*, 37 HARV. ENVTL L. REV. 313, 319 (2013) (discussing the concept of inside-out governance when agency accountability through judicial review is likely to be limited).

¹³ See, e.g., *Texas v. United States*, 809 F.3d 134 (5th Cir. 2015), *cert. granted*, 2016 WL 207257 (2016) (raising questions about the parameters for different actors to pursue policy initiatives in the administration and enforcement

Regardless of whether Congress, the President, or the agency (or some combination of them) decides that regulatory redesign is needed in the face of change, policymakers will need to decide which actors should participate in effecting the transformation and what their respective roles should be. Accordingly, the first element in our framework is designed to highlight the importance of identifying all of the relevant actors in any particular regulatory program and determining (or at least considering) the roles that each should play. In addition to federal officials, policymakers should account for the significant role that state actors may play. Environmental regulation, for example, is typically undertaken through a “cooperative federalism” institutional structure that carves out roles for both EPA and the states.¹⁴ Citizens also have a role to play in this regulatory compliance regime, as do, obviously, regulated parties themselves.

Policy design needs to consider how each of these actors can promote regulatory objectives in light of factors such as their respective capacities and the legitimacy of allocating implementation authority to each of them. For example, in previous work we have demonstrated that use of a cooperative federalism system in the environmental laws has at times compromised the legitimacy of the regulatory state by undermining accountability and transparency.¹⁵ Policy design that is based on a cooperative federalism approach should reflect an awareness of the potential for such a scheme to generate unintended consequences and presumably should include efforts to ameliorate those concerns. Similarly, the use of private lawsuits to supplement government enforcement – including the “controversial . . . marked shift. . . away from administrative . . . enforcement and toward the use of private lawsuits” – has raised questions about the implications of such a shift for both regulatory effectiveness and accountability.¹⁶ Increasing reliance on regulated parties to monitor their behavior similarly carries risks as well as benefits. These examples illustrate the importance of considering in policy design both the full range of potential actors and the features of the mechanisms that enable different actors to participate.

The second element of our framework implicates the legal mechanisms available to key actors in accomplishing transformational change in regulatory design. The mechanisms potentially available to an agency include planning and other actions that bear on the regulatory infrastructure, the issuance of regulations, the issuance of permits, and the use of adjudication to

of the immigration laws). Congress can still try to play a role, such as by using its oversight authority or by enacting appropriations bills. Further, it also may influence agency efforts to respond to change through the nature of the delegation it provides, but only if it adopts legislation that the President is willing to sign or if it is able to override a presidential veto.

¹⁴ For a description of these respective roles under the Clean Air Act, and how some judges have grossly mischaracterized them, see Robert L. Glicksman & Jessica A. Wentz, *Debunking Revisionist Understandings of Environmental Cooperative Federalism: Collective Action Responses to Air Pollution*, in *THE LAW AND POLICY OF ENVIRONMENTAL FEDERALISM: A COMPARATIVE ANALYSIS* (Kalyani Robbins & Erin Ryan, eds.) (Edward Elgar Pub., 2016).

¹⁵ David Markell, “Slack” in the Administrative State and Its Implications for Governance: *The Issue of Accountability*, 84 OR. L. REV. 1 (2005) [hereinafter Markell, *Slack*].

¹⁶ See, e.g., David F. Engstrom, *Agencies as Litigation Gatekeepers*, 123 YALE L.J. 616, 619 (2013). We examine below citizens’ capacity to participate in governance through enforcement adjudication and other mechanisms. See *infra* Part V.

enforce regulatory violations.¹⁷ Those responsible for regulatory design should consider all of the available mechanisms. Further, they should evaluate the potential roles of different actors in implementing each available mechanism. For example, the significant shift from public to private enforcement as a regulatory tool reflects the importance of considering the types of enforcement mechanisms that should be included in a legal regime, including the features that each such mechanism should possess.¹⁸

A third set of questions involves an assessment of the tools at policymakers' disposal to advance regulatory transformation in response to the dynamic character of challenges and opportunities. In the context of agency enforcement programs, for example, the relevant tools are likely to include monitoring and reporting regimes as well as features to enhance the transparency of compliance status and efforts to address it. In other regulatory contexts, the tools will necessarily differ. Further, tools that once have served regulatory objectives well may be inadequate if the regulatory environment has shifted, and new or more sophisticated versions of old tools may become available as a result of technological changes or other innovations. The types of tools available may well affect the roles that different actors, including government officials, regulated parties, and citizens, should be expected and empowered to play. Similarly, an agency engaged in redesign should consider how best to use available legal and non-legal mechanisms to promote desired use of different tools by different actors. Thus, all three variables in our framework need to be considered both independently and in tandem.

To illustrate the value of this three-pronged framework for designing regulatory programs and other governance mechanisms in ways that accommodate change, we begin, in Part II, by reviewing the ubiquity of change that implicates regulatory regimes and several of its triggers. In Parts III and IV, we then ground our conceptual framework by applying it to the federal Environmental Protection Agency (EPA)'s ongoing effort to transform its approach to regulatory enforcement because of the agency's perception that changing circumstances required dramatic changes in governance approaches. Part III reviews some of the more significant traditional challenges EPA has faced in promoting compliance with the environmental laws, as well as some of the emerging challenges that are causing the regulatory landscape to shift beneath its feet. Part IV briefly summarizes EPA's recent, and still evolving, Next Generation Compliance (Next Gen) initiative to transform EPA enforcement in light of these traditional and emerging challenges. EPA describes Next Gen as embodying a "new paradigm" for promoting compliance.¹⁹ In Part V we describe in general terms the advantages of the three-pronged conceptual framework we offer in regulatory policy design. We also show how use of our framework to consider the roles of citizens provides insights about design that might not otherwise emerge in the policy discussion about regulatory redesign. This case study illustrates the benefits of our framework both conceptually, and to real-world policy design. The

¹⁷ See, e.g., Edward Rubin, *It's Time to Make the Administrative Procedure Act Administrative*, 89 CORNELL L. REV. 95, 97 (2003) (listing priority setting, resource allocation, research, planning, targeting, guidance, and strategic enforcement, in addition to rulemaking and adjudication, as "modes of governance").

¹⁸ The citizen suit provisions of many of the federal environmental statutes illustrate the nuanced nature of this issue. Features include the possibility of recouping attorneys' and other fees in certain circumstances, the possibility of preemption, the need for adequate notice, and the possibility of mootness, among others. See, e.g., Symposium, *Environmental Citizen Suits at Thirtysomething: A Celebration and Summit, Parts I & II*, 10 WIDENER L. REV. Issues 1 & 2 (2003-2004).

¹⁹ Cynthia Giles, *Next Generation Compliance*, 30 ENVTL. F. 22, 22 (Sept.-Oct. 2013).

discussion in Part V sets the stage for the more detailed review of actors, mechanisms, and tools in the second of our two articles on *Dynamic Governance*. In that article, we continue to explore EPA's Next Generation effort more thoroughly, using it as a case study to illustrate how the use of our framework might improve administration of that (and other) regulatory programs by identifying insights as to the proper combination of actors, mechanisms, and tools that are less likely to emerge from EPA's reconceptualization of environmental compliance and enforcement structures.

II. Regulatory Dynamism Triggers

Effective regulatory design, including the design of enforcement programs, requires an understanding of the manner in which the regulatory environment, within and outside the agency, has shifted or is likely to shift over time and how those shifts affect the capacity of existing structures, programs, and strategies to achieve regulatory goals through the roles assigned to relevant actors, mechanisms, and tools.²⁰ Several factors may account for the existence of a dynamic regulatory environment, any of which may present challenges to policymakers seeking to craft and administer effective regulatory programs.²¹ This part introduces some of the most important triggers for regulatory dynamism.

A. Changes in the Physical World

Changes in the physical world may create a need for changes in regulatory strategies.²² These changes are obviously of critical importance to the development of environmental law. As Blake Hudson has recognized, "[o]ur world is composed of dynamic natural resources. In the natural environment forests burn, rivers flood, sea levels rise, and climate changes. . . . Instead of continuing to allow dynamic shifts in resource use and preservation to outpace legal and policy solutions, a key challenge faced by modern society is to find congruity between the shifts and the solutions."²³ Hudson argues, for example, that new threats facing forest resources in the United States have triggered a need for an overhaul of the legal regulatory framework for forest management, and that an appropriate response is the creation of minimum federal forest management standards.²⁴

Physical changes can prompt public values shifts or statutory changes that alter regulatory dynamics.²⁵ Crisis, often accompanied by physical change, has repeatedly been a spur

²⁰ See David L. Markell & Robert L. Glicksman, *A Holistic Look at Agency Enforcement*, 93 N.C. L. REV. 1, 40 (2014).

²¹ See David M. Driesen, *Legal Theory Lessons from the Financial Crisis*, 40 J. CORP. L. 55, 91 (2014) (arguing that "one cannot optimize the regulation of a dynamic system that makes frequent changes").

²² Under the "population ecology strain" of organizational theory, "an organization's behaviors are understood primarily as responses to external stimuli which encourage the organization to find a niche." Gwen Arnold & Forrest D. Fleischman, *The Influence of Organizations and Institutions on Wetland Policy Stability: The Rapanos Case*, 4 POL'Y STUDIES J. 343, 350 (2013). These stimuli can include changes in the physical environment that affect the need for regulation to address impacts regulated entities' behavior or the manner in which regulation should operate.

²³ Blake Hudson, *Dynamic Forest Federalism*, 71 WASH. & LEE L. REV. 1643, 1645-46 (2014).

²⁴ *Id.* at 1647; see also *id.* at 668 (calling for "a new wave of regulatory dynamism").

²⁵ See, e.g., Christopher Serkin, *Passive Takings: The State's Affirmative Duty to Protect Property*, 113 MICH. L. REV. 345, 371 (2014) (arguing that when "community needs are dynamic, the state's role in constituting property

to the adoption of new laws or regulations or the revision of existing laws that shift the focus of regulators (often by expanding their responsibilities). Certainly this dynamic is reflected in the development of environmental law. Congress enacted the Oil Pollution Act of 1990 after the *Exxon Valdez* oil spill in Alaska in 1989.²⁶ The massive Deepwater Horizon oil spill in the Gulf of Mexico in 2010 prompted the Obama Administration to reorganize the agencies responsible for permitting and regulating offshore oil exploration and production.²⁷ It also spurred Congress to adopt the Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012 (the RESTORE Act),²⁸ which, among other things, requires the Treasury Secretary to deposit 80 percent of administrative and civil penalties paid under the Clean Water Act by responsible parties in connection with the Deepwater Horizon incident into a trust fund that will finance activities relating to ecological and economic restoration in the Gulf states.²⁹ Physical changes that trigger the need for regulatory responses can also be gradual, however. EPA, for example, identified hydrologic change, which may be gradual or abrupt,³⁰ as a reason, among others, to alter a 30-year old set of regulations governing the establishment and review of state water quality standards under the Clean Water Act.³¹

B. Newly-Discovered Challenges and Mid-Course Corrections

Congress may amend existing statutory programs or create new ones even in the absence of physical change. Policymakers' assessments that existing statutory programs are not effectively achieving preexisting legislative goals may spur statutory or regulatory changes.³² Congress adopted the Comprehensive Environmental Response, Compensation, and Liability Act in 1980 largely because of its belief that the laws in effect did not provide the necessary firepower to respond to the discovery of the Love Canal and other sites contaminated with

rights must also be dynamic. Regulations and obligations that were not justifiable before may become so over time . . ."); John Robinson, Jr., *Rural Ozone Pollution: New Science, Old Rules*, 8 APPALACHIAN NAT. RESOURCES L.J. 149, 174 (2014) ("Dynamic regulations that can adjust quickly in response to new science, or to meet new public-health-related goals, should be the target.").

²⁶ ROBERT L. GLICKSMAN ET AL., ENVIRONMENTAL PROTECTION: LAW AND POLICY 990 (7th ed. Wolters-Kluwer 2015).

²⁷ Michael LeVine, Peter Van Tuyn & Layla Hughes, *Oil and Gas in America's Arctic Ocean: Past Problems Counsel Precaution*, 37 SEATTLE U. L. REV. 1271, 1370 n.198 (2014); David Hults, *Environmental Regulation at the Frontier: Government Oversight of Offshore Oil Drilling North of Alaska*, 44 ENVTL. L. 761, 832 n.7 (2014)

²⁸ Pub. L. No. 112-141, §§ 1601-1608, 126 Stat. 405, 588-607 (codified at 33 U.S.C. § 1321 note).

²⁹ See Gerald J. Pels & Julia C. Rinne, *The RESTORE Act: Legislation That Works for the Gulf Coast*, 27-Spg. NAT. RESOURCES & ENV'T 40 (2013).

³⁰ See Charles Rougé, Yan Ge & Ximing Cai, *Detecting Gradual and Abrupt Changes in Hydrological Records*, 53 ADVANCES IN WATER RESOURCES 33 (Mar. 2013).

³¹ U.S. Environmental Protection Agency, Water Quality Standards Regulatory Revisions; Final rule, 80 Fed. Reg. 51,020, 51,021 (Aug. 21, 2015):

Since 1983 . . . diverse and complex challenges have arisen, including new types of contaminants, pollution stemming from multiple sources, extreme weather events, hydrologic alteration, and climate change-related impacts. These challenges necessitate a more effective, flexible and practicable approach for the implementation of WQS and protecting water quality. Additionally, extensive experience with WQS implementation by states, authorized tribes, and EPA revealed a need to update the regulation to help meet these challenges.

³² See, e.g., Markell & Glicksman, *supra* note 19, at 39 (identifying "reality checks" by policymakers assessing past regulatory performance as a key aspect of regulatory design).

hazardous waste.³³ Another well-known example is Congress's decision after nearly 25 years of experience with water pollution legislation enacted in 1948 to shift in 1972 statutory amendments from a regime centered on water quality-based approaches to controlling pollution to one that relies on technology-based regulatory standards. Congress made this shift because implementation of the 1948 legislation highlighted the difficulty of proving cause-and-effect relationships between particular discharges and receiving water quality, for purposes of both adoption and enforcement of standards.³⁴ Even if legislatures do not respond to change by altering statutes, agency officials may decide that they need to alter their strategies to redress deficiencies in existing regulatory practices, including but not limited to enforcement matters.³⁵

C. Changes in the Nature or Operation of the Regulated Community

An additional driver of regulatory dynamism is change in the industry being regulated, whether it takes the form of unprecedented, dramatic change or ongoing, less revolutionary change. Such changes may be the product of shifts in the operation of relevant product or service markets such as the entry of new product or service providers into those markets, or the development of new technologies.³⁶ It is accepted wisdom that regulatory agencies often have a difficult time keeping pace with technological change, particularly when it is rapid.³⁷ Such change has the potential to disrupt the functioning of regulatory programs if they alter the manner in which regulated entities operate in ways that were not anticipated by regulation or that

³³ RICHARD J. LAZARUS, *THE MAKING OF ENVIRONMENTAL LAW* 108 (Univ. of Chicago Press 2004); David L. Markell, *The Federal Superfund Program: Proposals for Strengthening the Federal/State Relationship*, 18 WM. & MARY J. ENVTL. L. 1, 7-8 (1993).

³⁴ See Robert L. Glicksman & Mathew R. Batzel, *Science, Politics, Law, and the Arc of the Clean Water Act: The Role of Assumptions in the Adoption of a Pollution Control Landmark*, 32 WASH. U. J. L. & PUB. POL'Y 99, 118-21 (2010). Other examples of this kind of mid-course correction in regulatory programs based on past regulatory deficiencies are legion. See, e.g., GLICKSMAN ET AL., *supra* note 25, at 434-35 (describing deadline extensions, overhaul of existing regulatory provisions, and the creation of supplemental air pollution control programs in the 1977 and 1990 amendments to the Clean Air Act).

³⁵ See, e.g., Julia Lopez, *Formalizing the Segmentation of Workers' Rights: Tensions among Regulatory Levels*, 36 COMP. LAB. L. & POL'Y J. 281, 282 (2015) (discussing the effects of rise of soft law strategies).

³⁶ Cf. Kerri Lynn Stone, *Teaching the Post-Sex Generation*, 58 ST. LOUIS U. L.J. 223, 230 (2013) ("Since employment discrimination jurisprudence is always trying to outpace the behavior that it regulates, it remains dynamic and continually evolves.").

³⁷ Gregory N. Mandel & Gary E. Marchant, *The Living Regulatory Challenges of Synthetic Biology*, 100 IOWA L. REV. 155, 162 (2014) ("Regulatory systems, almost always, are designed for technologies existing at the time of the regulatory systems' formation and are based on the then-current understanding of that technology. Such systems often face difficulty and disruption when applied to newly emerging technologies."); see also Joseph J. Norton, *"International Financial Law," an Increasingly Important Component of "International Economic Law": A Tribute to Professor John H. Jackson*, 20 MICH. J. INT'L L. 133, 143 (1999) (discussing regulators' need to "catch up" with international financial market developments, "which are coming about with an almost unnerving speed as a result of the accelerated rate of technological innovation"); Rebecca M. Bratspies, *A Regulatory Wake-Up Call: Lessons from BP's Deepwater Horizon Disaster*, 5 GOLDEN GATE U. ENVTL. L.J. 7, 60 (2011) (discussing Minerals Management Service failure "to keep up with the technological innovations developed in the private sector"); Urs Gasser, *Regulating Search Engines: Taking Stock and Looking Ahead*, 8 YALE J. L. & TECH. 201 (2006) ("The history of technology-regulation is rich with examples of outdated laws."); Christopher S. Yoo, *Rethinking the Commitment to Free, Local Television*, 52 EMORY L.J. 1579, 1583 (2003) ("[D]rastic changes in the technological and business environment surrounding television have yet to effect corresponding changes in the regulatory approach taken by Congress and the FCC"); Alan Heinrich, Karl Manheim & David J. Steele, *At the Crossroads of Law and Technology*, 33 LOY. L.A. L. REV. 1035, 1042 (2000) ("[T]he rapid and dynamic pace of change undermines the effectiveness of traditional legislative solutions.").

do not fit current regulatory assumptions,³⁸ models, or objectives.³⁹ For example, the application of existing laws to new technologies may be unclear, creating uncertainty as to the nature of regulatory obligations.⁴⁰ EPA has recognized the need for clarity as an important feature if it is to hope for high levels of regulatory compliance, as we discuss below.⁴¹

The telecommunications, information technology, finance, chemical, and energy industries are obvious examples of industries undergoing recent upheavals that have created challenges for regulators.⁴² In the telecommunications industry, among others, the arrival of new technologies has created products or services that blurred the jurisdictional boundaries of multiple regulators,⁴³ created “open regulatory space” that attracted the attention of regulators,⁴⁴

³⁸ See Ronald F. Wright, *Letters from Beyond the Regulatory State After the Rights Revolution*: 100 YALE L.J. 825, 851 n.38 (1990) (book review) (“The factual assumptions regarding some regulatory statutes, such as banking or telecommunications laws, may be undermined by technological or social changes.”).

³⁹ See William Boyd, *Public Utility and the Low-Carbon Future*, 61 UCLA L. REV. 1614, 1616 (2014) (arguing that “disruptive technologies and deregulation have dramatically reduced the importance of the basic public utility model”); Dominic E. Markwordt, *More Folly Than Fairness: The Fairness Doctrine, the First Amendment, and the Internet Age*, 22 REGENT U. L. REV. 405, 450 (2010) (discussing the weakening of the Fairness Doctrine’s rationale due to technological change); Saule Omarova & Adam Feibelman, *Risks, Rules, and Institutions: A Process for Reforming Financial Regulation*, 39 U. MEM. L. REV. 881, 906 (2009) (noting that assumptions built into the framework for financial services regulation remained unquestioned, and that “the implications of the radical transformation in the risk profile of modern financial institutions were not sufficiently understood or even acknowledged”); Timothy Wu, *Application-Centered Internet Analysis*, 85 VA. L. REV. 1163, 1200-01 (1999) “[A] change in a technological ‘fact,’ even if apparently unrelated to the law, may nonetheless have large unexpected effects on the operation of that law.”).

⁴⁰ See, e.g., Olufunmilayo B. Arewa, *Securities Regulation of Private Offerings in the Cyberspace Era: Legal Translation, Advertising and Business Context*, 37 U. TOL. L. REV. 331, 363 (2006) (discussing securities regulation).

⁴¹ See *infra* Part IVB.1. Among other things, uncertainty can interfere with the intended deterrent effect of available sanctions. See Lyria Bennett Moses, *Understanding Legal Responses to Technological Change: The Example of in Vitro Fertilization*, 6 MINN. J.L. SCI. & TECH. 505, 569 (2005) (“In the context of technological change, there is a risk that application of existing rules will appear uncertain (reducing their deterrent effect) or existing rules will, on their terms, be under-inclusive. In either case, rules designed to address a particular problem may fail to prevent similar problems because they were not crafted in contemplation of future technological changes.”).

⁴² See, e.g., Andrew Erber, *The Effective Prohibition Preemption in Modern Wireless Tower Siting*, 66 FED. COMM. L.J. 357, 386 (2014) (referring to the telecommunications industry as “an increasingly dynamic and convergent sector”); Christopher S. Yoo, *Technological Determinism and Its Discontents*, 127 HARV. L. REV. 914, 938 (2014) (referring to the industry as one “undergoing . . . dynamic change”); Jamie Darin Prenkert & Scott J. Shackelford, *Business, Human Rights, and the Promise of Polycentricity*, 47 VAND. J. TRANSNAT’L L. 451, 455 (2014) (citing scholarship favoring the adoption of dynamic regulatory models in cyber law); Wulf A. Kaal, *Dynamic Regulation of the Financial Services Industry*, 48 WAKE FOREST L. REV. 791, 800 (2013) (discussing possible role of dynamic elements in financial regulation); Thomas J. Brennan & Andrew W. Lo, *Dynamic Loss Probabilities and Implications for Financial Regulation*, 31 YALE J. ON REG. 667, 678, 692 (2014) (citing “the need for dynamic leverage regulation that takes into account feedback effects and the endogeneity of volatility to the regulated financial system”); Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, 98 MINN. L. REV. 145, 201 (2013) (calling for dynamic regulation in the face of “the shale revolution”).

⁴³ William E. Kovacic, *The Federal Trade Commission as Convenor: Developing Regulatory Policy Norms Without Litigation or Rulemaking*, 13 COLO. TECH. L.J. 17, 24 (2015) (jurisdictional conflict between the FCC and FTC due to the development of broadband); K.A.D. Camara, *Costs of Sovereignty*, 107 W. VA. L. REV. 385, 432 (2005) (referring to increase in frequency and intensity of conflicts between state regulatory interests as technological change expands the geographic impact of conduct).

⁴⁴ The development of the internet is one example. See Babette E.L. Boliek, *FCC Regulation Versus Antitrust: How Net Neutrality Is Defining the Boundaries*, 52 B.C. L. REV. 1627, 1648 (2011); Lyombe Eko, *American*

and unified local markets into broader national and international markets, making businesses accountable to a larger number of regulatory regimes.⁴⁵ The development of nanotechnology is another example of technology-driven shifts in the nature of products subject to regulation. It has posed significant problems for environmental regulatory programs that were not crafted to deal with chemical substances with the properties of nanomaterials.⁴⁶ Technological innovation may expand the range of entities able to offer products or services, such as banking services, which are subject to regulation.⁴⁷ Technological changes in other “networked industries,” such as energy, have spurred innovations in regulatory ventures involving both federal and state agencies. The significant expansion in the scale and geography of shale gas development made possible by advances in exploratory and horizontal drilling technologies, among other factors, has required many states to “rapidly ramp up regulatory abilities” and triggered other governance reactions intended to keep pace with a rapidly evolving industry.⁴⁸ In short, as scholars have recognized, “a dynamic industry requires dynamic regulation.”⁴⁹

D. Changes in Technological and Other Forms of Governance Capacity

Exceptionalism, the French Exception, Intellectual Property Law, and Peer-to-Peer File Sharing on the Internet, 10 J. MARSHALL REV. INTELL. PROP. L. 95, 108 (2010).

⁴⁵ See Bob Rowe, *Substance Plus Process—Telecom Regulation Reforms to Protect Consumers, Preserve Universal Service, and Promote Competition*, 71 U. COLO. L. REV. 879, 879-80 (2000). The same phenomenon has occurred in other industries. See, e.g., Kovacic, *supra* note 42. Cf. John T. Soma & Eric K. Weingarten, *Multinational Economic Network Effects and the Need for an International Antitrust Response from the World Trade Organization: A Case Study in Broadcast-Media and News Corporation*, 21 U. PA. J. INT’L ECON. L. 41, 43 (2000) (“The rapid pace of technological innovation often blurs once separate product markets into cohesive wholes.”).

⁴⁶ See Jeffery T. Morris, *A Case for the Commonplace: Locating Nanotechnology Within Existing Regulatory Frameworks*, 55 JURIMETRICS J. 179, 179 (2015) (noting novel governance issues resulting from the emergency of nanotechnology). Morris adds that “the notion of treating the same chemical substance differently if it is produced at the nanoscale remains an unresolved issue—even after more than a decade of discussion.” *Id.* at 182.

⁴⁷ See Vivienne A. Lawack, *Mobile Money, Financial Inclusion and Financial Integrity: The South African Case*, 8 WASH. J.L. TECH. & ARTS 317, 343 (2013); Shanthi Elizabeth Senthe, *Transformative Technology in Microfinance: Delivering Hope Electronically?*, 13 U. PITT. J. TECH. L. POL’Y 1, 39 (2012). Technological innovation, however, can also promote deregulation. See, e.g., Steven M. Spaeth, *The Deregulation of Transportation and Natural Gas Production in the United States and Its Relevance to the Soviet Union and Eastern Europe in the 1990’s*, 12 U. BRIDGEPORT L. REV. 43, 95 (1991) (referring to communications deregulation).

⁴⁸ Mitchell J. Small et al., *Risks and Risk Governance in Unconventional Shale Gas Development*, 48 ENVTL. SCI. & TECH. 8289, 8290-93 (2014) (discussing the changes in technology that have contributed to improved capacity to develop shale gas deposits and accompanying regulatory issues); Hannah J. Wiseman, *Remedying Regulatory Diseconomies of Scale*, 94 B.U. L. REV. 235 (2014) (discussing the enormous changes in scale in fracturing); Hannah J. Wiseman, *Risk and Response in Fracturing Policy*, 84 U. COLO. L. REV. 729, 737 (2013) (same)).

⁴⁹ Michael S. Greve & Ashley C. Parrish, *Administrative Law without Congress*, 22 GEO. MASON L. REV. 501, 537 (2015); see also Adam Adler, *High Frequency Regulation: A New Model for Market Monitoring*, 39 VT. L. REV. 161, 164-65 (2014) (urging development of complex, dynamic, and flexible regulation algorithms in response to problems caused by dynamic trading algorithms); Deirdre McCann & Jill Murray, *Prompting Formalisation Through Labour Market Regulation: A “Framed Flexibility” Model for Domestic Work*, 43 INDUS. L.J. 319, 321, 335 (2014) (changes in informal labor markets).

Regulatory responses to technological changes may be ineffective in achieving regulatory goals if policymakers do not fully appreciate their implications. See, e.g., Eli P. Fenichel et al., *Measuring the value of groundwater and other forms of natural capital*, www.pnas.org/cgi/10.1073/pnas.1513779113, <http://www.pnas.org/content/early/2016/02/04/1513779113.full.pdf> (concluding that “[b]y failing to anticipate and mitigate the perverse consequences” of farmers’ technological transition to a new, high-efficiency irrigation nozzle, “statewide ‘investments’ in improved technology” resulted in less conservation-oriented agricultural practices and “destroyed wealth”).

As noted in the previous section, changes in the nature of the regulated community, linked to technological developments or otherwise, can pose significant challenges for agencies. Technological change and other forms of change in governance capacity can affect regulatory programs in other ways, both positive and negative. In some cases, improved capacity, through advances in technology and otherwise, may create significant opportunities for government to improve its practices. In the enforcement arena, for example, the beneficial regulatory byproducts of technological change can include improved (more thorough, more accurate, and more timely) identification of compliance issues, better communication internally and externally about compliance concerns, and more rational enforcement response when necessary.

New technologies that facilitate monitoring of or reporting on the effects of regulated activities may facilitate regulators' ability to turn a dynamic regulatory environment to their advantage by providing access to previously unavailable information relevant to compliance. By enabling the government to identify violations that otherwise likely would have remained undiscovered, and to develop cases much more easily, such information can lead to improved and better informed exercise of prosecutorial discretion in deciding whether and how to address violations.⁵⁰

Environmental regulatory enforcement clearly demonstrates this development. Gathering information sufficient to support enforcement actions has always been a challenge.⁵¹ Recent advances in areas such as electrical engineering can mitigate these challenges in the enforcement context by revolutionizing pollution monitoring.⁵² These technologies produce data that are more finely grained than cruder, previously available data and that can be more helpful in identifying environmental conditions, violations, and violators.⁵³ Geographic information systems, global positioning satellite technologies, and remote sensing devices already support the investigation and enforcement of environmental laws in ways that were not previously possible.⁵⁴ EPA has begun to institutionalize the use of enhanced monitoring capacity through

⁵⁰ See, e.g., Wulf A. Kaal & Timothy A. Lacine, *The Effect of Deferred and Non-Prosecution Agreements on Corporate Governance: Evidence from 1993-2013*, 70 BUS. LAW. 61, 116 (2015); cf. David A. Hyman & William E. Kovacic, *Why Who Does What Matters: Governmental Design and Agency Performance*, 82 GEO. WASH. L. REV. 1446, 1466 (2014) ("Technological dynamism creates new regulatory issues—and an opportunity for ambitious regulators to expand their domain."). For further discussion of the effects of new technology on enforcement, see *infra* §§ IIB.2-4.

⁵¹ See *infra* § IIA.1.

⁵² These include microfabrication techniques; microelectro-mechanical systems that can incorporate microfluidic, optical, and nanotube elements; energy efficient radios and sensor circuits that have extremely low power consumption; and advanced computing power suitable for handling extremely large databases. See Emily G. Snyder et al., *The Changing Paradigm of Air Pollution Monitoring*, 47 ENVTL. SCI. & TECH. 11369, 11369 (2013), <http://pubs.acs.org/doi/abs/10.1021/es4022602>. Dave Owen suggests that "increased data availability, new software systems, and exponentially greater computer power have combined to turn spatial analysis – that is quantitative analysis of data coded to specific geographic coordinates – into the coin of the environmental realm." Dave Owen, *Mapping, Modeling, and the Fragmentation of Environmental Law*, 2013 UTAH L. REV. 219, 222.

⁵³ For discussion of the challenges facing the collection and use of ambient monitoring data, see Eric Biber, *The Challenge of Collecting and Using Environmental Monitoring Data*, 18 ECOLOGY & SOC'Y 68 (2013), available at <http://www.ecologyandsociety.org/vol18/iss4/art68/>.

⁵⁴ See Peter Stokely, *Using Aerial Photography, Geospatial Data, and GIS to Support the Enforcement of Environmental Statutes*, 28-Summer NAT. RESOURCES & ENV'T 38 (2013). Remote sensing is "the science and art of obtaining information about an object, area, or phenomenon through the analysis of data acquired by a device not

ventures such as its E-Enterprise for the Environment, which is a joint EPA-state effort that includes applying advanced information to streamline information collection.⁵⁵

Advances in monitoring and reporting technology can strengthen the capacity of not only regulators, but also regulated entities and non-governmental entities to detect and address violations. This enhanced third party capacity presents opportunities for regulators to transform the shape of governance by improving coordination among a wide range of stakeholders in identifying and addressing noncompliance. EPA has historically relied heavily on compliance self-reporting, including discharge monitoring reports that point sources must submit under the Clean Water Act's National Pollutant Discharge Elimination System (NPDES) permit program⁵⁶ and the hazardous waste manifests that those handling hazardous waste must prepare under the Resource Conservation and Recovery Act.⁵⁷ Congress recently required EPA to establish a new electronic manifest reporting system.⁵⁸ According to EPA, the new system will “yield significant savings over the current paper manifest and will ease the reporting burden” for regulated entities.⁵⁹ It will “establish for the first time a national repository of manifest data, and a means to efficiently share manifest data with our authorized state partners and with the public.”⁶⁰ EPA identified the following benefits of the new system:

(1) Improved access to higher quality and more timely waste shipment data; (2) nearly real-time shipment tracking capabilities for users; (3) enhanced manifest inspection and enforcement capabilities for regulators; (4) more rapid notification and responses to problems or discrepancies encountered with shipments or deliveries; (5) greater access for emergency responders about the types and sources of hazardous waste that are in movement between generator sites and waste management facilities; (6) one-stop manifest copy submission to EPA and to all interested states through the Exchange Network architecture; (7) greater transparency for the public about completed hazardous waste shipments to or from their communities; and (8) new data management possibilities that could ultimately simplify the RCRA biennial reporting requirements and consolidate various federal and state reporting requirements for domestic and transboundary shipments.⁶¹

in contact with the object, area, or phenomenon under investigation.” Kenneth J. Markowitz, *Legal Challenges and Market Rewards to the Use and Acceptance of Remote Sensing and Digital Information as Evidence*, 12 DUKE ENVTL. L. & POL'Y F. 219, 221 (2002); see also Gregg P. Macey, *The Architecture of Ignorance*, 2013 UTAH L. REV. 1627, 1648; Nate Seltenrich, *Remote-Sensing Applications for Environmental Health Research*, 122 ENVTL. HEALTH PERSPECTIVES A269 (Oct. 2014), <http://ehp.niehs.nih.gov/122-a268/>.

⁵⁵ Environmental Protection Agency, *About E-Enterprise for the Environment*, [http://www2.epa.gov/e-enterprise/about-e-enterprise-environment#Core of E-Enterprise](http://www2.epa.gov/e-enterprise/about-e-enterprise-environment#Core%20of%20E-Enterprise); see also Snyder et al., *supra* note 51, at 11375 (discussing the role of advances in air pollution sensors in E-Enterprise); EPA Budget in Brief FY 2016, at 63, http://www2.epa.gov/sites/production/files/2015-02/documents/fy_2016_bib_combined_v5.pdf (noting that the “Next Generation Compliance initiative [discussed in Parts III and IV of this Article] is aligned with the larger EPA E-Enterprise business strategy, which is jointly managed with the states.”).

⁵⁶ See 40 C.F.R. § 122.41(l)(4)(i).

⁵⁷ See 40 C.F.R. § 262.20(a)(1).

⁵⁸ Hazardous Waste Electronic Manifest Establishment Act, Pub. L. No. 112-195, 126 Stat. 1452 (2012) (codified at 42 U.S.C. § 6939g). EPA's implementing regulations are codified at 40 C.F.R. §§ 262.24-262.25.

⁵⁹ U.S. Environmental Protection Agency, *Hazardous Waste Management System; Modification of the Hazardous Waste Manifest System; Electronic Manifests*, 79 Fed. Reg. 7518, 7523 (Feb. 7, 2014).

⁶⁰ *Id.*

⁶¹ *Id.*

Greater reliance on self-reporting by regulated entities to identify violations also poses risks, however. The prospect of increased reliance on regulated entities to supply and interpret information relating to compliance status, which is likely as a result of increased use of advanced monitoring techniques, may be perceived as exacerbating a “fox guarding the henhouse” problem. The Government Accountability Office (GAO) raised concerns decades ago that EPA’s water pollution and hazardous waste management programs lacked adequate controls to detect error or fraud in sampling data.⁶² Others have raised similar concerns.⁶³ Results from a recent study from Norway, for example, show evidence of severe under-reporting to Norway’s EPA of violations when regulated parties self-audit, the substantial specific deterrence effect on parties that were audited by regulators (resulting in reduction in likelihood of non-compliance the next year by 37%), and the lack of any evidence suggesting that announcing higher audit frequency improves compliance behavior.⁶⁴ The author emphasizes that the evidence of under-reporting in self-audits raises serious concerns that a shift toward reliance on self-reporting by environmental agencies could undermine regulatory compliance.⁶⁵ To the extent that new monitoring and reporting technology is more reliable, less capable of being manipulated, and more easily replicated because of reductions in cost, greater mobility and other factors, it may operate to increase the accuracy, reliability, and credibility of self-reporting and diminish the risks associated with a regulatory regime that depends on heavy (and growing) quasi-privatized monitoring.

Technological advances also provide opportunities to better integrate the public into the regulatory enforcement process, yielding a variety of benefits. If citizens and communities assist in data collection, they become more educated about environmental issues, which assists them in developing community-based strategies to protect public health.⁶⁶ The use of enhanced monitoring technology at the “fenceline” of regulated sources increases the potential to detect regulatory violations. EPA and state agencies have already begun to require regulated facilities to set up passive monitoring systems to measure environmental conditions at the fenceline by incorporating such requirements into consent decrees and other settlements,⁶⁷ and EPA has used its regulatory authority to establish fenceline monitoring requirements for sources that emit hazardous air pollutants as well.⁶⁸ This monitoring can strengthen the deterrent impact of

⁶² U.S. General Accounting Office, *Environmental Enforcement: EPA Cannot Assure the Accuracy of Self-Reported Compliance Monitoring Data*, GAO/RCED-93-21, at 3 (March 1993), <http://www.gao.gov/assets/160/153286.pdf>.

⁶³ EPA’s Office of Inspector General (OIG) has criticized EPA’s oversight mechanisms to prevent the submission of fraudulent data by external laboratories with which it contracts to provide environmental testing data. EPA, Office of Inspector General, *EPA Has Not Implemented Adequate Management Procedures to Address Potential Fraudulent Environmental Data*, Report No. 14-P-0270 (May 29, 2014), <http://www.epa.gov/oig/reports/2014/20140529-14-P-0270.pdf> [hereinafter *Fraudulent Data*]; see also U.S. Government Accountability Office, *Pesticide Safety: Improvements Needed in EPA’s Good Laboratory Practices Inspection Program*, GAO-14-289 (May 15, 2014), available at <http://www.gao.gov/products/GAO-14-289>.

⁶⁴ Professor Kjetil Telle, *Monitoring and Enforcement of Environmental Regulations: Lessons from a Natural Field Experiment in Norway*, 99 J. PUBL. ECON. 24 (2013).

⁶⁵ *Id.* at 24.

⁶⁶ See Snyder et al., *supra* note 51, at 11373 (discussing crowd sourcing to develop “citizen science”).

⁶⁷ Alec C. Zacaroli, *Clean Air Act: New Developments that Are Redefining the Enforcement Landscape*, 45 ENV’T REP. (BNA) 3108 (Oct. 24, 2014).

⁶⁸ See Petroleum Refinery Sector Risk and Technology Review and New Source Performance Standards; Final rule, 80 Fed. Reg. 75,178, 75,191-200 (Dec. 1, 2015); *id.* at 75,254-57 (codified at 40 C.F.R. § 63.658) (requiring refineries to deploy passive fenceline monitoring). One observer speculated at the time this rule was proposed that it would “likely will become the standard for other sources as well.” Zacaroli, *supra* note 66. A recent EPA OIG

regulations and foster higher compliance levels if regulated entities recognize that the data make it easier for enforcers, public and private, to prove violations or if they simply want to avoid the adverse public reaction stemming from disclosure of regulatory violations.⁶⁹ Some contend that, even in a time of declining EPA and state enforcement resources,⁷⁰ the emergence of new monitoring technology will increase the chance that regulatory violations will be detected, as enforcement activity shifts from the government to broader networks that include community groups and other non-governmental entities.⁷¹ Some of the new monitoring technology is available to the public at little or no cost from federal or state agencies,⁷² creating community “bucket brigades.”⁷³ In addition, EPA has provided technical assistance to help individuals and citizen groups (as well as regulated sources) use the new monitoring technology.⁷⁴ This dynamic will allow EPA to rely more on new governance mechanisms that integrate non-governmental entities into compliance and enforcement processes.⁷⁵ New information technologies will also affect federalism choices, such as by facilitating coordination among jurisdictions through easier information sharing.⁷⁶

As is the case for greater reliance on regulated entities’ self-monitoring, increased reliance on citizens for such monitoring poses risks as well as benefits. A lack of capacity to use technology properly or to interpret information correctly may lead to misunderstandings and false positives, and divert attention from more important concerns. Also, as we discuss below,⁷⁷ new data that leads to a more substantial level of citizen suit enforcement activity will pose coordination challenges for agency lawyers and other personnel. Agency enforcers will need to

report highlights the need for monitoring of commitments embodied in consent decrees. U.S. EPA OIG, *EPA Can Reduce Risk of Undetected Clean Air Act Violations Through Better Monitoring of Settlements Agreements* 16, Report No. 15-P-0277 (Sept. 10, 2015) [hereinafter OIG, *Reduce Risk*] (concluding that EPA had not “ensure[d]” compliance with requirements embodied in the consent decrees the OIG reviewed).

⁶⁹ See Zacaroli, *supra* note 66 (arguing that “communities that have the ability to gather air quality data create a ‘big motivator’ for companies to more closely monitor their own emissions”); see also Markowitz, *supra* note 53, at 228-29. Earlier iterations of improved data collection technologies have had that effect. See, e.g., Lesley K. McAllister, *Enforcing Cap-and-Trade: A Tale of Two Programs*, 2 SAN DIEGO J. CLIMATE & ENERGY L. 1, 4-8 (2010) (describing how continuous emissions monitoring equipment and automatic verification systems bolstered compliance levels under the CAA’s acid rain program).

⁷⁰ See *infra* § IIB.1.

⁷¹ See Zacaroli, *supra* note 66.

⁷² Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 115, 156-57 (2004) (noting that new monitoring technologies may revolutionize responses to environmental problems); see also Snyder et al., *supra* note 51, at 11369; Peter Grabosky, *Beyond Responsive Regulation: The Expanding Role of Non-State Actors in the Regulatory Process*, 7 REG. & GOVERNANCE 114, 118 (2013).

⁷³ Biber, *supra* note 52. Biber warns, however, that “many monitoring technologies are too expensive for most volunteer groups.” *Id.* See also Macey, *supra* note 53, at 1663 (arguing that “networked data render the public vital to government response”).

⁷⁴ See, e.g., EPA’s Air Sensor Toolbox for Citizen Scientists, <http://www.epa.gov/heads/airsensortoolbox/>; see also Environmental Protection Agency, Air Sensor Guidebook, EPA 600/R-14/159, at vii (June 2014) (new technology may assist those interested in using lower cost air quality sensor technologies).

⁷⁵ See Macey, *supra* note 53, at 1665 (“The public’s role as true first responders will widen. . . . Peer networks will provide data redundancy, and vulnerable populations will be motivated to share locations and contextual information.”); Owen, *supra* note 51, at 247 (“[T]echnological advances also can promote participation and inclusion.”).

⁷⁶ See Owen, *supra* note 51, at 273-78.

⁷⁷ See *infra* Part VA.

design regulatory enforcement programs in ways that maximize the benefits and minimize the risks arising from the use of new monitoring and reporting technologies.

More generally, technological advances in compliance monitoring and reporting pose additional challenges for regulators, including enforcement personnel. One challenge relates to privacy concerns that often accompany the accumulation of data not previously available.⁷⁸ A second is the possibility that legislators or other policymakers concerned about shrinking resources in an era of budget-cutting will depict expenditures on monitoring as unnecessary and unjustified.⁷⁹ A third is that, inherent in the increased use of quantitative data of any sort is the danger of manipulability, lack of transparency due to concealed modeling assumptions, and “false certainty.”⁸⁰

E. The Implications of Dynamism for Regulatory Design

In the face of changes in regulatory landscapes in many fields, some of which have been dramatic, scholars have urged modification of the structure, as well as the content, of regulatory programs to accommodate change. To take but one example, some scholars and policymakers have supported increased reliance on adaptive management, a decisionmaking methodology crafted specifically to deal with change. Adaptive management seeks “to reduce uncertainty through integrative learning fostered in a structured, iterative decisionmaking process. This approach is most relevant for dynamic regulatory contexts . . . in which uncertainty and controllability are high and risk is low.”⁸¹ Two proponents of adaptive management describe it as follows:

The idea of adaptive management is that agencies should be free to make more decisions, but that the timing of those decisions is spread out into a continuous process that makes differentiating between the “front end” and the “back end” of decisionmaking much less relevant. Rather than make one grand decision and move on, agencies employing adaptive management engage in a program of iterative decisionmaking following a structured, multistep protocol: (1) definition of the problem, (2) determination of goals and objectives for management, (3) determination of the baseline, (4) development of conceptual models, (5) selection of future actions, (6) implementation and management actions, (7) monitoring, and (8) evaluation and return to step (1). . . . With deep roots in natural resources management theory, the adaptive management protocol has begun to make inroads in public lands management in particular, though it has been applied or proposed in other policy contexts, including pollution control, financial regulation, environmental impact assessment, public health and safety, civil rights, and social welfare.⁸²

Other scholars have responded to the dynamism inherent in many contemporary governance issues, and the challenges dynamic conditions create for regulators, by urging other large-scale changes in governance approaches, such as greater reliance on self-regulation (a form of

⁷⁸ See Macey, *supra* note 53, at 1669 (discussing privacy and data security concerns stemming from the use of advanced monitoring technology).

⁷⁹ See Eric Biber, *supra* note 52 (referring to the vulnerability of politically meaningful monitoring to “asymmetric political pressure”).

⁸⁰ See Owen, *supra* note 51, at 224, 250 (identifying “opacity, manipulability, and false certainty that plague any complex and quantitative mode of analysis” and “concealed subjective choices” as limitations of spatial data).

⁸¹ Craig & Ruhl, *supra* note 6, at 20.

⁸² *Id.* at 7-8.

“reflexive regulation”),⁸³ shifts in federal-state or international organization relationships,⁸⁴ or greater use of incentives for the development of still more effective new technologies.⁸⁵

The challenges and opportunities facing regulators as they respond to changes of the kind identified in this part give rise to a plethora of issues relating to regulatory design. The remainder of this article offers a framework intended to advance the effort to think critically about the governance challenges posed by dynamic regulatory environments and to address them effectively. It does so by focusing on efforts to promote regulatory compliance, using environmental regulatory programs to illustrate the value of our framework.⁸⁶ Our analysis is motivated in part by recent efforts by EPA to grapple with some of the challenges noted above, primarily under the auspices of its Next Generation Compliance Initiative.⁸⁷ To further set the stage for this analysis, Part III discusses the regulatory dynamism triggers affecting EPA’s enforcement and compliance programs and the challenges that these changes have posed to EPA’s administration of those programs.

III. Traditional and Emerging Challenges to Effective Compliance and Enforcement

The purpose of this part is to ground our theoretical framework through a case study of one agency’s regulatory landscape. Our focus in this article is on environmental compliance, which has traditionally been under the domain of EPA. We begin by taking account of how well or poorly EPA’s current enforcement program is functioning. This part reviews the challenges EPA has faced and will face in pursuing its own enforcement agenda and in overseeing state enforcement under delegated environmental programs. Section A surveys four longstanding sets of challenges to state and federal enforcement of the environmental laws. Section B addresses four more recent sets of challenges that have made the task of enforcing environmental laws all the more daunting. As part of our evaluation of EPA’s claim that transformation of its enforcement program is needed, this part summarizes the baseline circumstances that EPA confronts.

⁸³ See, e.g., Michael P. Vandenbergh, *Private Environmental Governance*, 99 CORNELL L. REV. 129, 173 (2013); Robert F. Weber, *An Alternative Story of the Law and Regulation of Risk Management*, 15 U. PA. J. BUS. L. 1005, 1017 (2013) (discussing devolution of discretion to the banking industry to address a dynamic and volatile regulatory environment).

⁸⁴ See, e.g., Scott J. Shackelford, *Toward Cyberpeace: Managing Cyberattacks through Polycentric Governance*, 62 AM. U. L. REV. 1273, 1360 (2013) (referring to dynamic, multilevel regulation to enhance cybersecurity); Blake Hudson & Jonathan Rosenbloom, *Uncommon Approaches to Commons Problems: Nested Governance Commons and Climate Change*, 64 HASTINGS L.J. 1273, 1293 & n.58 (2013) (citing calls for various versions of dynamic regulatory federalism in areas such as climate change regulation).

⁸⁵ See, e.g., Keith Hawkins, *Enforcing Regulation: Robert Kagan’s Contribution and Some Questions*, 38 LAW & SOC. INQUIRY 950, 963 (2013). Still others have recommended frequent updating of regulatory standards. See, e.g., Wendy Wagner, *Racing to the Top: How Regulation Can Be Used to Create Incentives for Industry to Improve Environmental Quality*, 29 J. LAND USE & ENVTL. L. 1, 12 (2013); cf. Kaal, *supra* note 41, at 819 (“[R]ulemaking in a dynamic framework increasingly utilizes institution-specific and decentralized information reflecting preceding events and attempting to anticipate succeeding future contingencies.”).

⁸⁶ Our focus is on the major federal pollution control statutes, the Clean Air Act, Clean Water Act, and Resource Conservation and Recovery Act (RCRA).

⁸⁷ EPA is also using other initiatives, such as E-Reporting, to address the emergence of new monitoring and reporting technologies. See *infra* Part IVA.3. In its proposed fiscal year 2016 budget, EPA identified as one of its five strategic goals protecting health and the environment through the use of Next Gen tools to achieve vigorous and targeted civil and criminal enforcement. EPA Budget in Brief, *supra* note 54, at 61.

A. Traditional Enforcement Challenges

1. Data Gaps

“Data gaps haunt every scale of regulatory interest in environmental law”⁸⁸ According to Daniel Esty, these gaps affect problem identification, causal specification, evaluation of health and environmental impacts, valuation of harm, identification of rights, the nature of policy intervention, implementation, monitoring and enforcement, and updating and refinement.⁸⁹ Information deficiencies certainly plague efforts to enforce the environmental laws, to assess whether current enforcement strategies need to be improved and, if so, what fixes to adopt. EPA and state agencies sometimes lack complete information on the universe of regulated entities.⁹⁰ They may not be aware of all the facilities that are covered by regulatory programs and, even when they have identified facilities subject to regulation, they may not be aware of all of the activities taking place at those facilities that trigger regulatory duties.

Both EPA’s OIG and the GAO have noted these data deficiencies.⁹¹ The OIG reported in 2005 that “OECA has limited knowledge of the regulated universe for which it maintains responsibility.”⁹² Nearly a decade later, the OIG noted continuing problems in this area, finding that “EPA relies on the number of permits issued as a proxy for the number of facilities regulated by the agency. However, a single facility may have multiple permits, so the permit count is higher than the facility count. . . . EPA does not know the location of all regulated facilities. This results in underreporting for the facility universe.”⁹³ The GAO provided a specific example of EPA’s incomplete knowledge of the identity and location of sources subject to the regulatory programs it is responsible for enforcing. EPA does not maintain complete information on new source review (NSR) permits issued to fossil fuel electricity generating units under the Clean Air Act. Although state and local permitting agencies track the NSR permits they issue, for at least some source categories, such as fossil fuel electricity generating units, “EPA does not maintain

⁸⁸ Macey, *supra* note 53, at 1651; *see generally* Robert L. Glicksman, *Bridging Data Gaps Through Modeling and Evaluation of Surrogates: Use of the Best Available Science to Protect Biological Diversity Under the National Forest Management Act*, 83 IND. L.J. 465 (2008) (exploring the use of modeling by agencies to address data gaps).

⁸⁹ Esty, *supra* note 71, at 139 (Table 1).

⁹⁰ *See* Environmental Protection Agency, Office of Inspector General, *Limited Knowledge of the Universe of Regulated Entities Impedes EPA’s Ability to Demonstrate Changes in Regulatory Compliance*, Report No. 2005-P-00024, at 7 (Sept. 19, 2005), <http://www.epa.gov/oig/reports/2005/20050919-2005-P-00024.pdf> [hereinafter OIG, *Limited Knowledge*] (“With the exception of the [Safe Drinking Water Act], we found [EPA’s] universe data for the sampled programs was not reliable.”).

⁹¹ For citations to additional OIG and GAO reports substantiating data deficiencies that hampered performance of EPA’s enforcement functions, *see* Markell, *Slack*, *supra* note 14, at 31-32 nn.132-33.

⁹² OIG, *Limited Knowledge*, *supra* note 89, at 6. This conclusion was based on an assessment of EPA’s state of knowledge of the scope of the regulated universe under the Clean Air Act (CAA), the Clean Water Act (CWA), the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Toxic Substances Control Act (TSCA), the Safe Drinking Water Act (SDWA), and the Resource Conservation and Recovery Act (RCRA). *Id.* at 4. Of these, the OIG found that EPA had reliable and current data only for sources regulated under the SDWA. *Id.* at 8 (Table 2-2). For a description of the benefits of full knowledge of the regulated universe, *see id.* at 2; *see also id.* at 7 (“Without reliable universe information, OECA lacks both a definitive baseline on the number, size, and character of entities subject to regulation, as well as the information necessary to provide a denominator for compliance rates.”).

⁹³ EPA, Office of Inspector General, *Response to Congressional Request on EPA Enforcement*, Report No. 13-P-0168, at 6 (Feb. 28, 2013), <http://www.epa.gov/oig/reports/2013/20130228-13-P-0168.pdf>.

data on these permits in a complete and centralized source of information, which limits the agency's ability to assess the impact of NSR."⁹⁴

Relatedly, agencies often lack needed information about the compliance status of even those facilities they know fall within the scope of regulatory programs.⁹⁵ The GAO concluded in a 2012 report that "because of incomplete or unreliable data on compliance in some programs, such as the NPDES, EPA cannot determine the full extent of entities' compliance."⁹⁶ EPA itself has acknowledged as much.⁹⁷ EPA's ignorance of the compliance status of regulated entities appears to extend to a host of statutory programs. For example, the OIG found that EPA lacks a systematic framework for identifying violations of the dredge and fill permit program under section 404 of the Clean Water Act.⁹⁸ The OIG attributed this problem to "a limited field presence," finding that "EPA identifies violations through a passive, reactive method of relying on complaints and referrals from external sources. An incomplete national data system and sporadic coordination with federal and State partners further impair EPA's ability to maintain an effective § 404 enforcement program."⁹⁹ The GAO found that data provided by states to EPA failed to provide reliable information on the frequency of community water systems' violations of the SDWA's national drinking water standards, and that "the data did not reliably reflect the frequency of monitoring violations, which are a predictor of health-based violations."¹⁰⁰ A third

⁹⁴ U.S. Government Accountability Office, *Air Pollution: EPA Needs Better Information on New Source Review Permits*, GAO-12-590, at 7 (June 2012), <http://www.gao.gov/products/GAO-12-590>; see also Casey Roberts, *New York v. EPA: State Response to A Federal Regulatory Rollback*, 33 *ECOLOGY L.Q.* 613, 652 (2006).

⁹⁵ See OIG, *Limited Knowledge*, *supra* note 89, at 16 ("OECA could not determine or report on the levels of compliance with environmental regulations for five of our six sample regulatory areas."). The problem is longstanding. See Victor B. Flatt, *A Dirty River Runs Through It (The Failure of Enforcement in the Clean Water Act)*, 25 *B.C. ENVTL. AFF. L. REV.* 1, 32 (1997) (calling flawed or incomplete data systems or tracking methods "a severe problem that calls into question EPA's ability and desire" to monitor compliance at the state level).

⁹⁶ U.S. Government Accountability Office, *Environmental Protection: EPA Should Develop a Strategic Plan for Its New Compliance Initiative*, GAO-13-115, at 2 (2012) [hereinafter GAO, *Strategic Plan*], <http://www.gao.gov/assets/660/650711.pdf>; see also Joel A. Mintz, *Scrutinizing Environmental Enforcement: A Comment on A Recent Discussion at the AALS*, 17 *J. LAND USE & ENVTL. L.* 127, 143 (2001) (concluding that "partial and incomplete data" hinder efforts to evaluate EPA's enforcement success).

⁹⁷ See, e.g., *Fraudulent Data*, *supra* note 62, at 4 ("The EPA lacks a due diligence process for potential fraudulent environmental data. Although the EPA has three instruments that address how to respond to instances of fraudulent data, each instrument is out of date or unimplemented.").

OECA has agreed with the OIG's assessment, finding data deficiencies concerning important categories of sources subject to Clean Water Act regulation. U.S. EPA, Office of Enforcement and Compliance, *Clean Water Act Action Plan 4* (Oct. 15, 2009), <http://www.epa.gov/sites/production/files/documents/actionplan101409.pdf> [hereinafter EPA, CWAP]. OECA confessed that it lacked critical information on the compliance status of the biggest facilities, adding that "[i]f a facility isn't reporting, we don't know whether it is violating its permit limits." *Id.* at 3. In the face of these and other deficiencies, OECA promised to work with states to fill these gaps to help make informed decisions on how best to deploy limited enforcement resources. *Id.* at 7.

⁹⁸ 33 U.S.C. § 1344 (2012).

⁹⁹ EPA, Office of Inspector General, *EPA Needs a Better Strategy to Identify Violations of Section 404 of the Clean Water Act*, Report No. 10-P-0009, at 6 (Oct. 26, 2009), <http://www.epa.gov/oig/reports/2010/20091026-10-P-0009.pdf>; see also *id.* at 7. EPA shares authority to enforce the dredge and fill permit program with the U.S. Army Corps of Engineers. See 33 U.S.C. § 1344(n), (s) (2012).

¹⁰⁰ U.S. Government Accountability Office, *Drinking Water: Unreliable State Data Limit EPA's Ability to Target Enforcement Priorities and Communicate Water Systems' Performance*, GAO-11-381, at 13 (June 2011), <http://www.gao.gov/assets/320/319780.pdf>; see also *id.* at 17 (reporting that "the total number of monitoring violations is much higher than indicated by the SDWIS/Fed data, suggesting that the total number of health-based

example is the agency's inability to effectively monitor high priority violations under the Clean Air Act, assess results, and make informed policy changes due to data deficiencies.¹⁰¹

The GAO summarized this first challenge well several years ago. It concluded that, notwithstanding EPA's efforts to plug data gaps that hindered its own enforcement initiatives and its oversight of state enforcement, EPA "still needs comprehensive, accurate, and reliable data that would allow it to better target limited resources to those regions and potential pollution problems of the greatest concern."¹⁰² It echoed this conclusion more recently, finding that "because of incomplete or unreliable data on compliance in some programs, such as the NPDES, EPA cannot determine the full extent of entities' compliance."¹⁰³

2. Significant Noncompliance

A second challenge facing state and federal enforcement officials is the high incidence of noncompliance with regulatory obligations. As two scholars of environmental policy noted in 2014, "[s]ubstantial rates of non-compliance with traditional regulation have persisted even after decades of regulatory control."¹⁰⁴ The GAO found, for example, in a 2012 report that EPA data for 2010 showed that 45 percent of certain point sources subject to effluent limitations in NPDES permits reported violations.¹⁰⁵ The OIG had concluded in an earlier report that EPA Headquarters failed to provide effective oversight of state enforcement under delegated environmental programs, resulting in sources subject to high priority Clean Air Act obligations remaining out of compliance "longer than they should, leaving the potential for excess pollutants to be emitted."¹⁰⁶ This, too, is a problem that has been documented for years.¹⁰⁷

violations is also larger than indicated"); GAO, *Strategic Plan*, *supra*, note 95, at 2 ("[U]nreliable data in EPA's drinking water program limits EPA's ability to identify violations.").

¹⁰¹ EPA, Office of Inspector General, *EPA Oversight and Policy for High Priority Violations of Clean Air Act Need Improvement*, Report No. 10-P-0007, at 7 (Oct. 14, 2009), <http://www.epa.gov/oig/reports/2010/20091014-10-P-0007.pdf> [hereinafter OIG, *Priority*]. Data deficiencies have hampered other environmental programs. See, e.g., Vanessa Zborek, "Yes, in Your Backyard!" *Model Legislative Efforts to Prevent Communities from Excluding CAFOs*, 5 WAKE FOREST J.L. & POL'Y 147, 165 (2015) (enforcement of air quality standards against confined animal feedlot operations); Joanna Lau, *Nothing but Unconditional Love for Conditional Registrations: The Conditional Registration Loophole in the Federal Insecticide, Fungicide, and Rodenticide Act*, 44 ENVTL. L. 1177, 1195 (2014) (discussing EPA's acknowledgment data-tracking for pesticide registrations is out of date and inaccurate). Cf. Shannon M. Roesler, *The Nature of the Environmental Right to Know*, 39 ECOLOGY L.Q. 989, 1048 (2012) (incomplete and inadequate information in the toxic release inventory).

¹⁰² U.S. Government Accountability Office, *Clean Water Act: Longstanding Issues Impact EPA's and States' Enforcement Efforts: Statement of Anu K. Mittal, Natural Resources and Environment Team*, GAO-10-165T, at 14 (Oct. 15, 2009), <http://www.gao.gov/assets/130/123559.pdf> [hereinafter GAO, *Mittal*]; see also Mary L. Lyndon, *Secrecy and Access in an Innovation Intensive Economy: Reordering Information Privileges in Environmental, Health, and Safety Law*, 78 U. COLO. L. REV. 465, 501 (2007) ("data gaps" continue to undermine regulatory efforts").

¹⁰³ GAO, *Strategic Plan*, *supra* note 95, at 2.

¹⁰⁴ Cary Coglianese & Jennifer Nash, *Performance Track's Postmortem: Lessons from the Rise and Fall of EPA's "Flagship" Voluntary Program*, 38 HARV. ENVTL. L. REV. 1, 84 (2014).

¹⁰⁵ GAO, *Strategic Plan*, *supra* note 95, at 1.

¹⁰⁶ OIG, *Priority*, *supra* note 100, at 5.

¹⁰⁷ For example, the OIG concluded in 2000 that regional officials lacked reporting procedures to identify whole effluent toxicity (WET) violations by Clean Water Act permittees in North Carolina. As a result, "the Region could not work with the State to improve water quality in those important areas. U.S. EPA, Office of Inspector General,

Moreover, too much of this noncompliance is significant.¹⁰⁸ EPA itself has acknowledged the problem. Former EPA Administrator Lisa Jackson, for example, in a memorandum to the head of EPA's enforcement program, noted that "[w]e are . . . falling short of this Administration's expectations for the effectiveness of our clean water enforcement program. . . . Data available to EPA shows that, in many parts of the country, the level of significant non-compliance with permitting requirements is unacceptably high and the level of enforcement activity is unacceptably low."¹⁰⁹ Shortly thereafter, OECA issued a Clean Water Act Action Plan¹¹⁰ in which it characterized violations as "too widespread" and enforcement as "uneven."¹¹¹ OECA concluded that it needed to overhaul its enforcement approach to meet this set of challenges.¹¹²

3. *Shortcomings in State Enforcement*

The principal enforcers of the cooperative federalism environmental programs are the states, exercising authority delegated to them with EPA's approval.¹¹³ Faced with the kind of significant noncompliance described above, at least some states have performed inadequately and EPA's oversight of state enforcement has been problematic.¹¹⁴ In a report published in 2011, EPA's OIG described these failings in considerable detail.¹¹⁵ According to the OIG:

state enforcement programs frequently do not meet national goals and states do not always take necessary enforcement actions. State enforcement programs are underperforming: EPA data indicate that noncompliance is high and the level of enforcement is low. EPA does not consistently hold states accountable for meeting enforcement standards, has not set clear and consistent national benchmarks, and does not act effectively to curtail weak and inconsistent enforcement by states.¹¹⁶

Audit Report: North Carolina NPDES Enforcement and EPA Region 4 Oversight, Report No. 2000-P-00025 (Sept. 28, 2000), <http://www.epa.gov/sites/production/files/2015-12/documents/ncfile4.pdf>.

¹⁰⁸ See James Salzman, J.B. Ruhl & Kai-Sheng Song, *Regulatory Traffic Jams*, 2 WYO. L. REV. 253, 253 (2002) ("Studies by the General Accounting Office have consistently found significant noncompliance with the Clean Water Act."); Daniel A. Farber, *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*, 23 HARV. ENVTL. L. REV. 297, 304 (1999) (identifying high rates of significant noncompliance under the Clean Water Act).

¹⁰⁹ Press Release, U.S. EPA Administrator Jackson Takes Steps to Improve Water Quality (July 6, 2009), <http://yosemite.epa.gov/opa/admpress.nsf/0/ED67FE3CE2207400852575EB00681995>.

¹¹⁰ For discussion of the Plan, see Markell & Glicksman, *supra* note 19, at 64-75.

¹¹¹ EPA, CWAP, *supra* note 96, at Executive Summary.

¹¹² *Id.* at 5.

¹¹³ See Environmental Protection Agency, Office of Inspector General, *FY 2015 EPA Management Challenges*, 15-N-0164, at 1 (May 28, 2015), <http://www.epa.gov/oig/reports/2015/20150528-15-N-0164.pdf> [hereinafter OIG, *Challenges*] ("The EPA relies heavily on authorized states to obtain environmental program performance data and implement compliance and enforcement programs.").

¹¹⁴ See Lesley K. McAllister, *The Enforcement Challenge of Cap-and-Trade Regulation*, 40 ENVTL. L. 1195, 1221-22 (2010) ("Studies have suggested that the environmental enforcement conducted by many states in the past has been weak and inadequate.").

¹¹⁵ See GAO, *Strategic Plan*, *supra* note 95, at 2 (finding underperformance by state enforcement programs).

¹¹⁶ EPA Office of Inspector General, *EPA Must Improve Oversight of State Enforcement*, Report No. 12-P-0113, at ii (Dec. 9, 2011), <http://www.epa.gov/oig/reports/2012/20111209-12-P-0113.pdf>; [hereinafter OIG, *Improve*]; see also *id.* ("[S]tate performance remains inconsistent across the country, providing unequal environmental benefits to the public and an unlevel playing field for regulated industries.").

Deficiencies in state enforcement performance, and in EPA's oversight of state performance, ranged across the entire array of delegated programs.¹¹⁷ The OIG compared state performance with OECA's national enforcement goals, finding that all but one EPA region included at least one state that performed in the bottom quartile in one or more programs, apparently indicating that the problem was widespread, not just concentrated in one state or region.¹¹⁸ EPA's goal was that states inspect 100 percent of major Clean Air Act emitters every two years, but only eight states met that goal.¹¹⁹ EPA set a national goal that states enter 100 percent of high-priority CAA violations into EPA data systems within sixty days, but only two states met that goal.¹²⁰ Similar problems arose under the Clean Water Act. Only one state met EPA's 2006 goal of inspecting 100 percent of major point sources each year.¹²¹ The next year, EPA issued a new Compliance Monitoring Strategy that reduced the goal to inspection of 100 percent of major sources every two years, beginning in 2009. But the national average in 2010 was only 61 percent. Only two states met this inspection goal, while 13 states inspected fewer than 50 percent of major facilities.¹²² EPA set a goal under RCRA that state agencies inspect 100 percent of large quantity waste generators every 5 years, but in 2010, states on average inspected only 62 percent of these facilities, and only two states met the 100 percent goal.¹²³

The OIG found that state performance varied widely across the country, by as much as 50 percentage points for Clean Air Act enforcement. "[S]ome states inspected facilities, identified violations, and/or assessed penalties for violations at a much higher rate than other states."¹²⁴ Moreover, EPA did not consistently hold regions accountable for ensuring that states adequately enforce environmental laws, failing to set clear and consistent benchmarks for state performance,¹²⁵ and to ensure that the regional offices followed national oversight guidance.¹²⁶ Among other things, even though OECA, regional, and state enforcement officials all agreed that states were underperforming, these failings precluded EPA's national headquarters from "objectively know[ing] which states require immediate intervention," and EPA regions "did not consistently intervene to correct deficient state performance."¹²⁷

The OIG report represents a snapshot of federal and state enforcement failings at a particular point in time. The OIG, however, has reported similar problems more recently. It concluded in 2015, for example, that regional oversight of inspections of facilities regulated under FIFRA was plagued by inadequate guidance and training. According to the OIG, "[i]mprovements are needed to increase assurance that pesticides are not misused and do not

¹¹⁷ See, e.g., OIG, *Challenges*, *supra*, note 112, at 2-4 (describing deficiencies in state enforcement and in EPA oversight across a host of regulatory programs).

¹¹⁸ OIG, *Improve*, *supra* note 115, at 8.

¹¹⁹ *Id.* at 9.

¹²⁰ *Id.*

¹²¹ *Id.*

¹²² *Id.* at 8.

¹²³ *Id.* at 10.

¹²⁴ *Id.*

¹²⁵ "Most of the performance requirements established in the laws and regulations are not easily measurable. For example, the regulations require appropriate penalties, but do not define 'appropriate.'" *Id.* at 12.

¹²⁶ *Id.* at 11.

¹²⁷ *Id.* at 16.

pose unnecessary risks to human health and the environment.”¹²⁸ Moreover, these examples are consistent with recurring concerns expressed by some. One commentator, citing studies from the 1990s and early 2000s, concluded that “states are not enforcing environmental laws as stringently as would the federal government—in effect, state agents are shirking their enforcement responsibilities.”¹²⁹

4. *Linking Enforcement Choices to Environmental Conditions (Metrics)*

One final challenge that has long plagued agency enforcement officials is the difficulty of ascertaining what impact different enforcement choices would have on public health and environmental quality. Environmental law has grappled with the difficulty of drawing cause-and-effect linkages between particular activities, such as the activities of a polluter or group of polluters, and an environmental quality problem, such as ambient concentrations that exceed regulatory standards. As Todd Aagaard describes, complex lines of causation are an important characteristic of environmental law, and one that creates considerable difficulties for environmental lawmaking.¹³⁰

Similar causal conundrums apply in the enforcement context. Michael Vandenberg has described the problem cogently:

EPA recently has attempted to link reports of environmental performance to human health and environmental harms and to coordinate this effort with state enforcement agencies through a variety of initiatives. Nevertheless, activity counts (e.g., the number of orders issued or cases filed) still dominate the data collection and reporting efforts. The linkage between enforcement and human health and environmental quality is extremely difficult to make, and in most cases EPA has only been able to identify the amount of pollutants reduced by an enforcement action, not the corresponding effect on human health or the environment. In addition, the tort liability implications of linking a specific release to human health or environmental harms may create strong incentives for firms to dispute government assertions of linkages.¹³¹

Vandenberg concluded that inadequate monitoring capacity hampers the ability of enforcement officials to link reductions in noncompliance rates or in pollutants emitted to changes in health

¹²⁸ EPA Office of Inspector General, *EPA's Oversight of State Pesticide Inspections Needs Improvement to Better Ensure Safeguards for Workers, Public and Environment Are Enforced*, Report No. 15-P-0156, at 6 (May 15, 2015), <http://www.epa.gov/oig/reports/2015/20150515-15-P-0156.pdf>.

¹²⁹ Mark Atlas, *Enforcement Principles and Environmental Agencies: Principal-Agent Relationships in A Delegated Environmental Program*, 41 LAW & SOC'Y REV. 939, 941 (2007). For book-length treatment of concerns about state enforcement and EPA oversight, see CLIFFORD RECHTSCHAFFEN & DAVID L. MARKELL, *REINVENTING ENVIRONMENTAL ENFORCEMENT AND THE FEDERAL-STATE RELATIONSHIP* (ELI 2003).

¹³⁰ Todd S. Aagaard, *Environmental Law as a Legal Field: An Inquiry in Legal Taxonomy*, 95 CORNELL L. REV. 221, 270-71 (2010) (“[I]t is still unclear whether humans have the capacity to understand and plan over the scope required for effective environmental lawmaking.”); see also Richard J. Lazarus, *Restoring What's Environmental About Environmental Law in the Supreme Court*, 47 UCLA L. REV. 703, 744-48 (2000) (describing attributes of ecological injury that make it difficult to establish cause and effect linkages); Richard J. Lazarus, *Human Nature, the Laws of Nature, and the Nature of Environmental Law*, 24 VA. ENVTL. L.J. 231, 240 (2005) (arguing that scientific uncertainty will increase as “the laws of nature spread cause and effect out over time and space”).

¹³¹ Michael P. Vandenberg, *Beyond Elegance: A Testable Typology of Social Norms in Corporate Environmental Compliance*, 22 STAN. ENVTL. L.J. 55, 91-92 (2003).

and environmental quality.¹³² Ultimately, Vandenberg asserts, “[t]he allocation of enforcement resources to those environmental violations that cause the greatest harm to human health or the environment is obviously an important objective, but the added benefit of increasing compliance through the use of the information on the harms caused by noncompliance has received little attention.”¹³³

B. Emerging Enforcement Challenges

EPA and state agencies have grappled for years with the traditional challenges described above, which pose obstacles to effective enforcement of environmental laws. This section describes a non-exhaustive array of notable additional challenges of more recent vintage, which exacerbate the difficulties created by the traditional challenges. These include declining resources, increased responsibilities, differentiation of regulated entities’ duties, and a recognition that enforcement officials need to focus more attention on small sources.

1. Declining Resources

Effective enforcement requires sufficient resources to investigate potential regulatory violations and pursue enforcement actions against those responsible for committing them. It is no secret that both EPA and the states in recent years have cut funding for environmental programs. EPA’s funding has waxed and waned over the years. Adjusting for inflation, EPA’s funding in fiscal year 2009 (7.2 billion)¹³⁴ was slightly lower than in fiscal year 1978.¹³⁵ Between fiscal years 2000 and 2010, the agency’s budget rose in nominal terms from \$7.8 billion to \$10.4 billion, but remained relatively flat over this period in real terms.¹³⁶ Adjusted for inflation, the 2014 funding level was still slightly below the level provided in fiscal year 1977.¹³⁷ Funding was cut by an additional \$60 million for fiscal year 2015.¹³⁸ Thus, the agency’s funding fell during a period in which, as described in the next section, its responsibilities increased significantly.

¹³² *Id.* at 92.

¹³³ *Id.* at 93-94.

¹³⁴ EPA received \$14.8 million in appropriated funds in fiscal year 2009, but about half took the form of emergency supplemental appropriations under the American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115. ROBERT ESWORTHY ET AL., CONG. RESEARCH SERV., R42520, ENVIRONMENTAL PROTECTION AGENCY (EPA): APPROPRIATIONS FOR FY2013, at 2, 39, 41 (2012), <https://www.fas.org/sgp/crs/misc/R42520.pdf>. [hereinafter ESWORTHY, FY2013].

¹³⁵ *Id.* at 39.

¹³⁶ U.S. Government Accountability Office, *Management Challenges and Budget Observations: Statement of David C. Trimble, Director, Natural Resources and Environment*, GAO-12-149T, at 1 (Oct. 12, 2011), <http://www.gao.gov/assets/590/585707.pdf>.

¹³⁷ ROBERT ESWORTHY & DAVID M. BEARDEN, ENVIRONMENTAL PROTECTION AGENCY (EPA): APPROPRIATIONS FOR FY2014 IN P.L. 113-76, at 28 (2014) (Figure A-1), <https://www.fas.org/sgp/crs/misc/R43689.pdf>. EPA’s website provides funding numbers that are even lower than those described above. For example, EPA indicates its budget in 2013 was only \$7.9 billion and only \$8.1 billion in 2014. See EPA’s Budget and Spending, <http://www2.epa.gov/planandbudget/budget>.

¹³⁸ Nancy Ognanovich, *Obama Signs 2015 Spending Bill that Would Cut \$60 Million from EPA*, 45 ENV’T REP. (BNA) 3657 (Dec. 19, 2014).

Funding for EPA's Environmental Programs and Management, which includes enforcement activities,¹³⁹ also fell from \$2.9 billion in fiscal year 2010 to \$2.6 billion in fiscal year 2014.¹⁴⁰ Inflation-adjusted funding for OECA specifically fell significantly between 1994 (about \$690 million) and 2000 (about \$605 million) and then wavered slightly up or down between 2000 and 2013 (\$620 million).¹⁴¹ OECA's budget for fiscal year 2015 was almost nine percent lower than it was in 2010.¹⁴²

The real decline in EPA's budget over the last decade or more has forced the agency to cut back on the size of its workforce. EPA's peak staffing occurred in fiscal year 1999, when it employed 18,110 people. That number declined to 17,106 in 2012 and to 15,408 in 2014, a figure lower than any year since 1990.¹⁴³ Staffing levels fell below 15,000 by early 2015.¹⁴⁴ These workforce reductions affected enforcement staffing. EPA also reduced the size of the regional enforcement workforce, which is responsible for most of the agency's enforcement activity, by about five percent between fiscal years 1997 and 2006 from 2,568 full-time equivalent (FTE) staff to 2,434 FTEs. The OECA headquarters workforce declined one percent during this same period.¹⁴⁵

The decline in resources available to the federal government for environmental protection programs generally, and for enforcement functions specifically, impacts state enforcement under delegated programs.¹⁴⁶ Shrinkage of the dollars flowing to EPA makes it more difficult for EPA to subsidize the operation of state programs. Total state and tribal assistance grants fell from \$4.9 billion in fiscal year 2010 to \$3.5 billion in fiscal year 2014, a 29 percent decline.¹⁴⁷ Between fiscal years 2008 and 2014 annual appropriations for EPA categorical grants to assist

¹³⁹ ESWORTHY & BEARDEN, *supra* note 136, at 30. Declines in resources from other sources, such as permitting fees, can indirectly affect the agency's enforcement activities. Shortfalls in fees generated by Clean Air Act permitting caused EPA to shift non-Title V revenue to fund Title V programs, making those funds unavailable for other purposes. EPA Office of Inspector General, *Enhanced EPA Oversight Needed to Address Risks from Declining Clean Air Act Title V Revenues*, Report No. 15-P-0006, at 9 (Oct. 20, 2014), <http://www.epa.gov/oig/reports/2014/20141020-15-P-0006.pdf>. EPA's OIG, like those of other federal agencies, has experienced its own budget cuts, adversely affecting the capacity to oversee agency activities. See KEARNEY & CO., ACCELERATING CHANGE: THE 2015 INSPECTOR GENERAL SURVEY 5, 9-10, 18 (Sept. 15), <https://www.agacgfm.org/AGA/ResearchPublications/IG%20survey%20sept.%202015/AGA-IG-Survey-2015.pdf>.

¹⁴⁰ ESWORTHY & BEARDEN, *supra* note 136, at 26. The OIG reports that "[i]n fiscal years 2013 and 2014, the EPA directed almost one-tenth of its enacted annual budget to enforcing environmental laws and promoting compliance. This amounts to almost \$1.5 billion in fiscal years 2013 and 2014 combined." OIG, *Reduce Risk*, *supra* note 67, at 1.

¹⁴¹ Jay P. Shimshack, *The Economics of Environmental Monitoring and Enforcement*, 6 ANN. REV. RES. ECON. 339, 344 (2014) (Figure 1); see also James Alm & Jay Shimshack, *Environmental Enforcement and Compliance: Lessons from Pollution, Safety, and Tax Settings*, 10 FOUND. & TRENDS IN MICROECONOMICS 210, 217 (2014).

¹⁴² Renee Schoof, *Air Toxics, Hazardous Waste Top EPA Enforcement Priorities*, 47 ENV'T REP. (BNA) S-62 (Jan. 15, 2016).

¹⁴³ See EPA's Budget and Spending, *supra* note 136.

¹⁴⁴ Robin Bravender, *Workforce shrinks to level last seen in late 1980s*, GREENWIRE, Mar. 2, 2015.

¹⁴⁵ GAO, *Mittal*, *supra* note 101, at 7-8.

¹⁴⁶ See, e.g., Will Reisinger, Trent A. Dougherty & Nolan Moser, *Environmental Enforcement and the Limits of Cooperative Federalism: Will Courts Allow Citizen Suits to Pick up the Slack?*, 20 DUKE ENVTL. L. & POL'Y F. 1, 21 (2010) (noting that state budget cuts and shortfalls threaten the effectiveness of cooperative federalism).

¹⁴⁷ ESWORTHY & BEARDEN, *supra* note 136, at 26-27.

states in implementing delegated programs shrunk by about \$24 million.¹⁴⁸ The Environmental Council of the States (ECOS) has expressed concern about reductions in federal funding for state environmental programs.¹⁴⁹ It has concluded, for example, that “[i]nsufficient resources hinder adequate State field presence at water systems” covered by the SDWA, rendering the states “unable to adequately follow up on any significant deficiencies discovered during [so-called sanitary surveys] or to prepare the necessary enforcement orders.”¹⁵⁰

To make matters even more challenging, many states cut their own budgets for environmental agencies at the same time that federal funding for EPA programs and delegated state programs fell. ECOS concluded in 2009 and 2010 that reductions in state budgets for environmental enforcement threatened the viability of state enforcement programs.¹⁵¹ Between fiscal years 2011 and 2012, 24 states reduced funding for their environmental agencies,¹⁵² reflecting a trend of decreasing funding for state environmental agencies, which, according to ECOS, jeopardizes state implementation of federally delegated programs.¹⁵³ The GAO emphasized the growing importance of federal grants in the face of state reductions in funding for environmental programs.¹⁵⁴ Some states responded to reduced funding for environmental programs by reducing staff levels and cutting outreach and technical assistance programs that can facilitate compliance.¹⁵⁵ State environmental officials have reported to the GAO that resource constraints have resulted in hiring freezes, staff attrition and layoffs, and, ultimately, the diminished capacity of the states to conduct permitting, inspections, and monitoring, all of which are critical to effective enforcement.¹⁵⁶

EPA has acknowledged the adverse impacts of declining resources, albeit in some cases by putting a positive gloss on the problem. In an article describing its Next Generation Compliance initiative, Cynthia Giles, the Assistant Administrator for OECA, noted that “[e]ven in a time of declining budgets, we are developing more innovative approaches [such as Next Generation Compliance] to help us get better protection.”¹⁵⁷ EPA was perhaps more forthright

¹⁴⁸*Id.* at 26 (2014); *see also* U.S. Government Accountability Office, *Funding for 10 States’ Programs Supported by Environmental Protection Agency Categorical Grants*, GAO-13-504R, at 4-5 (May 6, 2013), <http://www.gao.gov/products/gao-13-504r> [hereinafter GAO, *Categorical*].

¹⁴⁹ *See* Markell & Glicksman, *supra* note 19, at 53-54 (citing ECOS, *March 2008 Green Report: State Environmental Expenditures 2005-2008*, March 12, 2008, <http://www.ecos.org/section/states/spending>). ECOS is a non-profit organization working to improve the operation of state environmental agencies. Environmental Council of the States, *Organizational Structure and Bylaws* 1 (March 18, 2015).

¹⁵⁰ The Environmental Council of the States, *The State Environmental Agencies’ Statement of Need and Budget Proposal for EPA’s 2013 Categorical Grants STAG Budget (State and Tribal Assistance Grants)* 21 (2011), http://www.ecos.org/files/4482_file_ECOS_Proposal_for_EPAs_2013_STAG_Budget.pdf.

¹⁵¹ Markell & Glicksman, *supra* note 19, at 54.

¹⁵² R. Steven Brown, Env’tl. Council of the States, *Status of State Environmental Agency Budgets, 2011-2013*, at 1 (Sept. 2012), <http://dl.dropboxusercontent.com/u/41680992/September%202012%20Green%20Report.pdf>. The 24 states with decreasing budgets experienced larger changes than the 25 states with increasing budgets, and the total decline in state environmental agency budgets from FY2011 to FY2012 averaged \$357,015 per state. *Id.*

¹⁵³ *See id.* at 2, 5.

¹⁵⁴ GAO, *Categorical*, *supra* note 147, at 1.

¹⁵⁵ *Id.* at 4, 9. On the potential value of technical assistance and outreach by regulators, *see* Carol Foley & Michael Elliott, *Systems Design and the Promotion of Pollution Prevention: Building More Effective Technical Assistance Programs*, 29 GA. L. REV. 449 (1995).

¹⁵⁶ GAO, *Categorical*, *supra* note 147, at 4, 9-10.

¹⁵⁷ Giles, *supra* note 18, at 26.

in its 2014-2018 Strategic Plan, which describes Next Generation as “the right direction for the agency regardless of resources because it will increase effectiveness, and it becomes more urgent in a time of challenging budgets. . . .”¹⁵⁸ Even more to the point, EPA officials told the GAO that it has become increasingly difficult to rely primarily on its traditional approach of inspecting individual entities to increase compliance with the nation’s environmental laws and regulations.¹⁵⁹ They also told the agency’s OIG that, in terms of compliance monitoring strategy, EPA’s enforcement office has “sought to balance . . . the need to continue to maintain a credible enforcement presence. . . , the multi-year decline in resources . . . available for all enforcement activities, and the increasing complexity of matters covered by EPA’s settlement agreements.”¹⁶⁰ As one prominent scholar of EPA enforcement noted even before the funding cuts of the last several years began, EPA “has suffered from a regulatory agenda and work load that far exceeds the size of its staff and available funding.”¹⁶¹ Scholars have made similar assessments about state enforcement capacity.¹⁶²

One sign of the likely impact of declining resources on enforcement capacity is the anticipated number of enforcement activities EPA will initiate in the coming years. Output measures are not a definitive measure of the impact of environmental enforcement.¹⁶³ EPA has explained, for example, that its commitment to pursuing large, complex cases that will have the biggest environmental impact necessarily requires a reduction in the number of cases overall. According to the agency, this shift toward bigger but fewer cases will not reduce the protective impact of its enforcement activities.¹⁶⁴ Nevertheless, the numbers provided in EPA’s latest five-year strategic plan seem to presage a significant decline in enforcement activity. EPA projects that over the period 2014-2018, it will conduct an average of 15,800 inspections and evaluations each year.¹⁶⁵ During the period 2005-2009, that number was 21,000, so that the agency estimates a 25 percent decline over the period 2014-2018.¹⁶⁶ The agency projected similar declines in other enforcement activities, including initiation of civil judicial and administrative enforcement cases (2800, as compared to 3900 during the baseline period, a 29 percent decline) and conclusions of civil judicial and administrative enforcement cases (2720, 3800; a 29 percent decline).¹⁶⁷

¹⁵⁸ ENVIRONMENTAL PROTECTION AGENCY, FISCAL YEAR 2014-2018 EPA STRATEGIC PLAN 39 (2014), http://www2.epa.gov/sites/production/files/2014-09/documents/epa_strategic_plan_fy14-18.pdf [hereinafter EPA, FY 2014-2018].

¹⁵⁹ GAO, *Strategic Plan*, *supra* note 95, at 2.

¹⁶⁰ OIG, *Reduce Risk*, *supra* note 67, at 25.

¹⁶¹ William L. Andreen, *Federal Climate Change Legislation and Preemption*, 3 ENVTL. & ENERGY L. & POL’Y J. 261, 298 (2008).

¹⁶² See, e.g., Donald T. Hornstein, *Complexity Theory, Adaptation, and Administrative Law*, 54 DUKE L.J. 913, 956 (2005) (referring to inadequate “budgetary and manpower capability [the states] felt were necessary to do their jobs”).

¹⁶³ See, e.g., Joel A. Mintz, *Measuring Environmental Enforcement Success: The Elusive Search for Objectivity*, 44 ENVTL. L. REP. 10751, 10753 (2014) (discussing shortcomings of output measures).

¹⁶⁴ EPA, FY 2014-2018, *supra* note 157, at 38 (2014); see also EPA Budget in Brief, *supra* note 54, at 62 (noting the agency’s intention to allocate resources to noncompliance having the most significant impact, which will lead EPA to pursue higher impact, “large, complex cases that require significant investment and a long-term commitment”).

¹⁶⁵ EPA, FY 2014-2018, *supra* note 157, at 73.

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

In addition, EPA projects declines in the real world impacts of enforcement-related activities. Over the five-year period covered by the latest plan, EPA expects to reduce, treat, or eliminate an average of 318 million estimated pounds of air pollutants each year as a result of concluded enforcement actions. For the period 2005-2009, that number was 480 million pounds, 33 percent more than for the period 2014-2018.¹⁶⁸ The agency projects similar declines in pollution reduced for other media, including pounds of water pollutants reduced, treated, or eliminated (256 million, 320; 20 percent decline), pounds of hazardous waste treated, minimized, or properly disposed of (2920 million, 6500; 55 percent decline), commitments to clean up contaminated solid and groundwater media as a result of RCRA and CERCLA corrective action (205 million cubic yards, 300; 31 percent decline), and pounds of toxic and pesticide pollutants reduced, treated, or eliminated (2.8 million, 4.6, a 29 percent decline).¹⁶⁹

In announcing EPA's annual enforcement and compliance data for 2014, Assistant Administrator Giles referred again to the "challenges posed by budget cuts."¹⁷⁰ A former OECA Assistant Administrator remarked more bluntly in 2015 that "[t]he reduction in the enforcement budget and staff for [EPA] is impacting the ability to do enforcement actions. . . ."¹⁷¹ The trend lines, which appear to have been affected by resource declines, are hard to misunderstand. The numbers for civil enforcement case initiations and conclusions and for federal inspections and evaluations, for example, are down in each case for virtually every year from 2009-2014.¹⁷²

The numbers for civil case initiations and conclusions rose slightly in fiscal year 2015 (2380 as compared to 2268 initiations in 2014; 2360 as compared to 2275 for conclusions), but not enough to match 2013 figures and were still almost 1000 below 2011 figures (when the number for both initiations and conclusions was about 3300).¹⁷³ The number of federal inspections and evaluations fell by 200 (to about 15,400) in 2015, which EPA again specifically attributed to budgetary cuts.¹⁷⁴ In other respect, however, the numbers improved in 2015, including for administrative and civil judicial penalties assessed (which doubled from 2014 to 2015 but still fell slightly below the figure for 2012) and the monetary value of supplemental environmental projects resulting from EPA enforcement actions (an increase from \$17 million in 2014 to \$39 million in 2015, the highest figure since 2012).¹⁷⁵

¹⁶⁸ *Id.*

¹⁶⁹ *Id.* at 73-74. We arrived at the average annual figures for the period 2014-2018 by dividing the cumulative numbers provided in EPA's plan for the entire five-year period by five.

¹⁷⁰ She also attributed declining enforcement numbers in part to the government shutdown that occurred in 2014. Robin Bravender, *Enforcement actions decline again; agency blames shutdown, budget woes*, GREENWIRE, Dec. 18, 2014. Giles also referred again to the agency's pursuit of large, high impact cases. *Id.*

¹⁷¹ 46 ENV'T REP. (BNA) 1029 (April 3, 2015) (quoting Granta Nakayama).

¹⁷² ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE, FISCAL YEAR 2014 EPA ENFORCEMENT AND COMPLIANCE ANNUAL RESULTS 8-9 (2014), <http://www2.epa.gov/sites/production/files/2014-12/documents/fy-2014-enforcement-annual-results-charts-12-08-14.pdf#page=8>.

¹⁷³ U.S. EPA, Office of Enforcement and Compliance Assurance, *Fiscal Year 2015, EPA Enforcement and Compliance: Annual Results* 11 (Dec. 16, 2015), http://www.epa.gov/sites/production/files/2015-12/documents/fy-2015-enforcement-annual-results-charts_0.pdf#page=3.

¹⁷⁴ *Id.* at 12.

¹⁷⁵ *Id.* at 4, 13. The value of fines and restitution and court-ordered environmental projects in criminal cases also rose significantly in 2015, mostly due to a single criminal case involving Duke Energy. *Id.* at 6. Of the approximately \$4 billion in court-ordered environmental projects, the Duke Energy case accounted for about \$3.4 billion. Dep't of Justice, Office of Public Affairs, *Duke Energy Subsidiaries Plead Guilty and Sentenced to Pay*

2. *Increased Regulatory Responsibilities*

Another challenge to federal and state enforcement officials, which has exacerbated the adverse effects of declining budgets, has been an increase in the number of entities subject to environmental regulation and in EPA and state environmental responsibilities.¹⁷⁶ Regulatory responsibilities expanded through much of the 1980s and early 1990s as a result of the enactment of new statutory programs (such as the Comprehensive Environmental Response, Compensation, and Liability Act in 1980¹⁷⁷ and the Emergency Planning and Community Right-to-Know Act in 1986¹⁷⁸) and the dramatic expansion of existing regulatory programs, which drew many new sources within the scope of those programs—through amendments to RCRA in 1984,¹⁷⁹ the CWA in 1987,¹⁸⁰ and the CAA in 1990.¹⁸¹

Recent changes in interpretation of the scope of the CWA and in EPA implementation strategies are illustrative. EPA noted in 2015 that “[t]he NPDES permitted universe has grown and diversified over the last 25 years without comparable increases in resources.”¹⁸² The number of point sources subject to CWA permitting requirements doubled over a recent ten-year period.¹⁸³ An appellate court decision established, for example, that pesticide applications that allow chemical residues to enter surface water bodies may trigger regulation under that statute, even if they did not do so previously.¹⁸⁴ The court held that “it is clear that under the meaning of the Clean Water Act, pesticide residue or excess pesticide—even if treated as distinct from pesticide—is a pollutant discharged from a point source because the pollutant is ‘introduced into a water from the “outside world” by’ the pesticide applicator from a ‘point source.’”¹⁸⁵ Stormwater permitting has also increased the size of the regulated community.¹⁸⁶ An increase in

\$102 Million for Clean Water Act Crimes (May 14, 2015), <http://www.justice.gov/opa/pr/duke-energy-sub-sidiaries-plead-guilty-and-sentenced-pay-102-million-clean-water-act-crimes>.

¹⁷⁶ See, e.g., Bruce Harper, *Trust but Verify: Innovation in Compliance Monitoring as a Response to the Privatization of Utilities in Developed Nations*, 48 ADMIN. L. REV. 593, 614 (1996) (“An increase in the number of generators alone holds some potential to make environmental enforcement more difficult.”); see also EPA Budget in Brief, *supra* note 54, at 62 (“The sheer number of regulated facilities, the contributions of large numbers of smaller sources, and limited resources means that EPA cannot rely on the traditional single facility inspection and enforcement approaches to ensure widespread compliance.”); Linda K. Breggin, *Increasing Federal Outreach to States*, 32 ENVTL F. 10 (referring to simultaneous increase in EPA responsibilities and dramatic resource decline).

¹⁷⁷ Pub. L. No. 96-510, 94 Stat. 2767 (1980).

¹⁷⁸ Pub. L. No. 99-499, 100 Stat. 1729 (1986).

¹⁷⁹ Pub. L. No. 98-616, 98 Stat. 3224 (1984).

¹⁸⁰ Pub. L. No. 100-4, 101 Stat. 60 (1987).

¹⁸¹ Pub. L. No. 101-549, 104 Stat. 2468 (1990). An OIG report found a 35% increase in the number of sources covered by six statutory programs between 2001 and 2005. See OIG, *Limited Knowledge*, *supra* note 89, at 7 (Table 2-1).

¹⁸² ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF WATER, FY 2016-17 NATIONAL WATER PROGRAM GUIDANCE, EPA 420-R-15-008, at 48 (2015), http://www2.epa.gov/sites/production/files/2015-04/documents/2016-2017_nwpg_final.pdf. EPA had referred to the “breadth and expanding scope of the National Pollutant Discharge Elimination System (NPDES) regulated universe” as one of the challenges it faces in improving its enforcement performance. EPA, CWAP, *supra* note 96, at 10.

¹⁸³ Lesley K. McAllister, *Regulation by Third-Party Verification*, 53 B.C. L. REV. 1, 21-22 (2012).

¹⁸⁴ See *National Cotton Council of Am. v. EPA*, 553 F.3d 927 (6th Cir. 2009).

¹⁸⁵ *Id.* at 940.

¹⁸⁶ See, e.g., OIG, *Limited Knowledge*, *supra* note 89, at 7 (identifying 45% increase in sources requiring CWA stormwater permits between 2001 and 2005); see also EPA, CWAP, *supra* note 96, at Executive Summary (“The

the number of regulated sources necessarily increases federal responsibilities as well as state responsibilities under delegated programs such as the NPDES permit program.

The expanding universe of regulated activities can burden federal and state regulators.¹⁸⁷ Under the CWA, NPDES permits are for a fixed term that may not exceed five years.¹⁸⁸ Over the years, EPA and state environmental agencies have developed a backlog in responding to requests to issue permits that should have expired, a problem to which declining resources and an expanded regulatory community likely contributed. In one case, environmental groups sought a writ of mandamus requiring EPA to reissue permits issued to two steam electric power plants. The Court of Appeals for the First Circuit denied the request, ruling that the groups failed to meet the requirements for mandamus relief, which is “a drastic remedy” reserved for “extraordinary situations.”¹⁸⁹ The court acknowledged that “EPA’s delays in reissuing the NPDES permits are concerning and extensive,” but concluded that EPA was entitled to “balance competing priorities with its limited resources, . . . and . . . it has prioritized permits that have greater environmental impacts.”¹⁹⁰ The court noted with approval EPA’s projection that it would get to the expired permits in another three years.¹⁹¹ This example is consistent with the findings reflected in a GAO report published in 2009, which found that “our work over the past 9 years has shown that the Clean Water Act has significantly increased EPA’s and the states’ enforcement responsibilities, available resources have not kept pace with these increased needs, and actions are needed to further strengthen the enforcement program.”¹⁹²

One way to reduce these kinds of burdens is the creation of general permits, such as the ones available under the CWA’s dredge and fill¹⁹³ and NPDES¹⁹⁴ permit programs. Indeed, EPA has developed a general permit for pesticide and herbicide applications over surface waters.¹⁹⁵ Although general permits reduce the resource commitment a government agency must make at the permit approval stage, agencies still have ongoing responsibility to monitor, oversee

regulated universe has expanded from the roughly 100,000 traditional point sources to nearly one million far more dispersed sources such as animal feeding operations and storm water runoff.”). During the same period, the number of manufacturers covered by TSCA increased by 61%. *Id.* Likewise, discharges from expanding hydraulic fracturing activities may trigger CWA requirements. *See* Robin Kundis Craig, *Hydraulic Fracturing (Fracking), Federalism, and the Water-Energy Nexus*, 49 IDAHO L. REV. 241, 249 (2013).

¹⁸⁷ *See* Kara Cook, Note, *The Middle Ground of Pesticide Regulation: Why EPA Should Use a Watershed-Based Permitting Scheme in Its New Aquatic Pesticides Rule*, 37 ECOLOGY L.Q. 451, 486 (2010) (noting “significant monitoring and enforcement challenges” due to “sudden explosion in permitting applicants”).

¹⁸⁸ 33 U.S.C. § 1342(b) (2012) (state permits); *id.* § 1342(a)(3) (EPA-issued permits).

¹⁸⁹ *In re* Sierra Club, 2013 WL 1955877, at *1 (1st Cir. 2013).

¹⁹⁰ *Id.*

¹⁹¹ *Id.*; *see also* EPA Eyes Changing Benchmark for Measuring Outdated CWA Permits, ENVTL. POLICY ALERT, April 15, 2015, at 21, www.insideepa.com.

¹⁹² GAO, *Mittal*, *supra* note 101, at 14; *see also* ESWORTHY, FY2013, *supra* note 133, at 39 (noting that funding for enforcement “had not kept pace with the increasing number of mandates and regulations, or with inflation”).

¹⁹³ 33 U.S.C. § 1344(e) (2012).

¹⁹⁴ *See, e.g.*, 40 C.F.R. § 122.28(a); California Sportfishing Prot. Alliance v. Chico Scrap Metal, Inc., 728 F.3d 868 (9th Cir. 2013) (involving California’s Industrial Activities Storm Water General Permit). *See generally* Jeffrey M. Gaba, *Generally Illegal: NPDES General Permits Under the Clean Water Act*, 31 HARV. ENVTL. L. REV. 409, 413 (2007).

¹⁹⁵ *See, e.g.*, Final National Pollutant Discharge Elimination System (NPDES) Pesticide General Permit for Point Source Discharges From the Application of Pesticides, 76 Fed. Reg. 68,750 (Nov. 7, 2011).

reporting, inspect, and enforce.¹⁹⁶ If agencies accompany a switch from source-specific to general permitting with efforts to minimize oversight of sources covered by general permits such as through reduced inspections or enforcement, the result is likely to be a decline in verifiability and accountability and, most likely, compliance.¹⁹⁷

3. *Differential Treatment of Regulated Entities*

A third enforcement challenge of increasing significance involves changes in the nature of regulatory approaches. One reason for shifting regulatory strategies is the failure of the first generation of approaches to solve environmental problems. For example, although the technology-based approach to controlling water pollution discharges resulted in significant reductions in water pollution levels, many water bodies remained too polluted to support desired uses such as fishing or swimming. As a result, EPA has expanded its focus in implementing the CWA to include not only enforcement of technology-based effluent limitations applicable to point sources, but also to achieving state water quality standards through the implementation of ambient quality-based effluent limitations.¹⁹⁸

One of the problems with this shift, however, is that it reintroduces some of the difficult causation problems that Congress sought to minimize when it adopted the Clean Water Act in 1972.¹⁹⁹ Implementation of water quality standards in waters with ambient concentrations above those allowed by the standards requires a state environmental agency to establish, and allocate among sources of pollution, a total maximum daily load (TMDL), which is an aggregate amount of pollution that may be discharged into a surface water body without resulting in concentrations of regulated pollutants in excess of those allowed by a state water quality standard.²⁰⁰

¹⁹⁶ See, e.g., 76 Fed. Reg. at 68,775 (listing among Pesticide General Permit requirements the duties of applicators to monitor adverse incidents and document visual monitoring activities). General NPDES permits may regulate one or more discharge categories, provided all sources within a category are subject to the same or similar monitoring requirements. 40 C.F.R. § 122.28(a)(2)(ii)(D).

¹⁹⁷ The literature on compliance is unsettled on many issues, but there is considerable support for the notion that, other things being equal, lack of monitoring and sanctions is likely to reduce compliance. Jodi Short & Michael W. Toffel, *Making Self-Regulation More Than Merely Symbolic: The Critical Role of the Legal Environment*, 55 ADMIN. SCI. Q. 361, 388 (2010); cf. Alm & Shimshack, *supra* note 140, at 210 (noting that “the overall effectiveness and cost-effectiveness of environmental monitoring and enforcement are controversial and incompletely understood”).

¹⁹⁸ See, e.g., GLICKSMAN ET AL., *supra* note 25, at 673 (noting increase in the role of water quality standards); Oliver A. Houck, *The Clean Water Act Returns (Again): Part I, TMDLs and the Chesapeake Bay*, 41 ENVTL. L. REP. 10208 (2011); Robert W. Adler, *Resilience, Restoration, and Sustainability: Revisiting the Fundamental Principles of the Clean Water Act*, 32 WASH. U. J.L. & POL’Y 139, 151 (2010) (“The current CWA focus on maintenance is reflected most clearly in the water quality standards provisions.”).

¹⁹⁹ For discussion of the impact that the difficulty of proving cause-and-effect relationships between discharges and ambient water quality had on implementation of the 1948 federal water pollution control legislation, and how Congress sought to avoid the need to demonstrate such relationships in the 1972 Federal Water Pollution Control Act Amendments, see Glicksman & Batzel, *supra* note 33, at 119-21.

²⁰⁰ *Upper Blackstone Water Pollution Abatement Dist. v. EPA*, 690 F.3d 9, 14 n.8 (1st Cir. 2012) (quoting 33 U.S.C. § 1313(d)(1)(C)). The focus on enforcement of TMDLs is largely the result of citizen suits resulting in court decrees requiring the establishment of delinquent TMDLs. See Oliver A. Houck, *Cooperative Federalism, Nutrients, and the Clean Water Act: Three Cases Revisited*, 44 ENVTL. L. REP. 10426, 10429 (2014) (stating that the “TMDL program lay dormant for a decade and a half until awakened by EPA intervention (stimulated in turn by environmental citizen suits”). This example illustrates the need for policymakers engaged in regulatory design to

Establishing the TMDL, allocating allowable discharge amounts, monitoring whether allowed loadings (clearly enforceable or less so) are producing desired environmental results, and adapting to the findings are all resource-intensive enterprises, perhaps especially if the target is a vague narrative standard rather than a numerical target.²⁰¹ Determining whether a point source violated technology-based effluent limits, which are often expressed as caps on end-of-pipe discharges, is a relatively simple matter by comparison. Agency efforts to improve water quality by restoring and maintaining ecologically functioning ecosystems will likely create similar ripple effects on enforcement strategies.²⁰² Expansion of the CWA permit program to cover stormwater permitting may make regulators' enforcement tasks more difficult because regulation of stormwater discharges often takes the form of best management practices rather than end-of-pipe discharge limits.²⁰³ It may be harder to track compliance status with mandates that take the form of ongoing operating practices than it is for numerical discharge limits that can be monitored.²⁰⁴ As regulatory challenges change, so do enforcement challenges.

Another change in regulatory approach that is likely to create new enforcement challenges is the shift from traditional regulatory techniques such as technology-based limits that apply to classes of regulated sources to strategies that tailor regulatory duties to the circumstances of individual regulated entities, including the use of inter-source transactions to shift responsibilities among regulated entities.²⁰⁵ In the early years of the pollution control statutes, EPA asserted its authority to establish the responsibilities of regulated entities through the issuance of nationally applicable regulations that would impose uniform requirements for categories of sources, such as polluting facilities in the same industry.²⁰⁶ One of the reasons for taking this approach was EPA's recognition that it could implement statutory programs such as the CWA's effluent limitation program much more quickly if it could tackle entire categories of sources with one fell swoop rather than having to establish such requirements on a source-by-source basis.²⁰⁷ Over the years, many critics of this approach argued that it resulted in inefficient

consider how one aspect of a regulatory program (such as the availability of citizen enforcement) may affect other such aspects (such as the task of regulators to translate TMDLs into source-specific effluent limitations).

²⁰¹ The regulatory and non-regulatory enterprise of seeking to bring an impaired water up to a desired state is complex. Cf. Sarah Birkeland, *EPA's TMDL Program*, 28 *ECOLOGY L.Q.* 297, 300 (2001) (referring to "the implementation and enforcement challenges faced by the EPA's TMDL program").

²⁰² GLICKSMAN ET AL., *supra* note 25, at 606 (describing new objectives geared toward restoration and maintenance of functioning ecosystems and toward control of nonpoint source pollution).

²⁰³ See, e.g., *Decker v. Nw. Env'tl. Def. Ctr.*, 133 S. Ct. 1326, 1338 (2013).

²⁰⁴ See Robert L. Fischman & Jeffrey B. Hyman, *The Legal Challenge of Protecting Animal Migrations as Phenomena of Abundance*, 28 *VA. ENVTL. L.J.* 173, 223 (2010) ("BMPs are harder to monitor and enforce than traditional technology-based limitations because the BMPs are more widely dispersed across the landscape.").

²⁰⁵ U.S. environmental law has long been criticized for reliance on traditional regulatory approaches that fail to recognize differences among sources in the costs of controlling pollution. See, e.g., Bruce Ackerman & Richard Stewart, *Reforming Environmental Law*, 37 *STAN. L. REV.* 1333 (1985). Policymakers have responded by incorporating market-based mechanisms such as tradeable permits into statutes such as the CAA. See, e.g., 42 U.S.C. § 7651b(b) (2012) (acid rain allowance trading programs).

²⁰⁶ See, e.g., *E.I. du Pont de Nemours & Co. v. Train*, 430 U.S. 112 (1977) (holding that EPA may issue effluent limitation regulations applicable to categories of industrial point sources under the CWA).

²⁰⁷ See William Funk, *The Exception that Approves the Rule: FDF Variances Under the Clean Water Act*, 13 *B.C. ENVTL. AFF. L. REV.* 1, 8-9 (1985) ("Of course, industry was well aware that bifurcating the effluent limitation decision, by requiring guidelines initially, would substantially delay the date any limitation would become enforceable.").

regulation because, for instance, it required equal levels of control for sources with different impacts on the ambient environment.²⁰⁸

In time, EPA responded by moving toward a more source-specific focus and toward greater reliance on market-based mechanisms such as emissions trading that have the potential to increase the efficiency of pollution reductions. Cynthia Giles remarked in describing EPA's Next Generation Compliance program that "market strategies that set standards but allow companies to decide how best to get there can be simple and effective in the right circumstances, reducing costs and providing flexibility for industry while achieving better results."²⁰⁹ She cited as a successful example of market-based programs the acid rain control program adopted in the 1990 Clean Air Act amendments.

The adoption of a market-based approach does not necessarily require the adopting agency to craft different requirements for each individual discharger. An agency, for example, could rely on a technology-based approach in imposing initial uniform obligations on all sources within a particular industry and allocate tradeable allowances based on those obligations. If the agency authorized emission trading, sources would be free to overcomply and sell allowances or undercomply and buy allowances, creating a regime in which emission caps vary from discharger to discharger. Such an approach, however, may impose burdens on the agency at the enforcement stage, as it would need to ascertain the nature and extent of enforceable duties of individual regulated entities based on their participation (or lack of participation) in the trading regime.²¹⁰ In addition, some emissions trading markets have been exploited through the sale of credits for environmental improvements that would have occurred even without regulation, credits for which sellers have already been fully paid either in the same or another market, or credits that did not occur at all except on paper.²¹¹ Colorado noted that the burden on agencies to improve compliance may increase when requirements are tailored rather than consistent across an industry, not only because it will be more difficult for government inspectors to determine compliance, but also because "it may be more difficult to implement a self-certification program where individualized permits determine unique facility-specific compliance requirements."²¹²

²⁰⁸ See, e.g., Ackerman & Stewart, *supra* note 204, at 1335 (arguing that uniform technology-based requirements waste money by ignoring variations among in the cost of reducing pollution, and that a more cost-effective strategy of could free resources for other purposes)

²⁰⁹ Giles, *supra* note 18, at 24.

²¹⁰ See, e.g., Dennis D. Hirsch, *Protecting the Inner Environment: What Privacy Regulation Can Learn from Environmental Law*, 41 GA. L. REV. 1, 39 (2006) ("[I]t is easier to keep track of a uniform technology than to police facility-specific pollution reduction strategies. . . . [S]trategies [that] encourage differentiation . . . offer less in the way of strict accountability and enforceability and open the door to bad-faith attempts to game the system.").

²¹¹ See Philip Womble & Martin Doyle, *The Geography of Trading Ecosystem Services: A Case Study of Wetland and Stream Compensatory Mitigation Markets*, 36 HARV. ENVTL. L. REV. 229, 291-92 (2012). For descriptions of exploitations of environmental regulatory markets, see Robert L. Glicksman, *Regulatory Safeguards for Accountable Ecosystem Service Markets in Wetlands Development*, 62 U. KAN. L. REV. 943 (2014); Richard Toshiyuki Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL'Y F. 231 (1999); see also Nicklas A. Akers, *New Tools for Environmental Justice: Articulating a Net Health Effects Challenge to Emissions Trading Markets*, 7 HASTINGS W.-N.W. J. ENVTL. L. & POL'Y 203 (2001).

²¹² Joe Schieffelin et al., Colo. Dep't of Pub. Health & Env't, Colorado's Hazardous Waste Small Quantity Generator (SQG) Self-Certification Program 18 (2013), https://www.colorado.gov/pacific/sites/default/files/HM_hw-sqg-self-certification-report_0.pdf.

4. *The Need to Address Small Sources*

A final enforcement challenge is the effort to identify significant environmental threats from sources that are emitting or discharging relatively small amounts, but whose violations may be cumulatively significant. As indicated above, programs like the NPDES permit program under the CWA have recently begun to account more closely for numerous small sources.²¹³ Small sources have not typically been the focus of agency enforcement attention.²¹⁴ As EPA's OIG has reported, "OECA concentrates most of its compliance monitoring and enforcement activities on large entities, and knows little about the identities or cumulative pollution effects of small entities."²¹⁵ In particular, at least as of 2005, OECA had failed to analyze the cumulative impact of entities emitting pollution below the threshold of major or large sources.²¹⁶ Yet, some data show significant noncompliance rates among such sources.²¹⁷ EPA has acknowledged the problem and seems determined to address it.²¹⁸ One recent step has been the agency's 2015 electronic reporting rule,²¹⁹ which requires state-authorized NPDES programs to share program data with EPA for nonmajor facilities, and is intended to "improve the ability of existing state and federal programs to target the most serious water quality and compliance problems. . . ."²²⁰ If enforcement initiatives target small sources, enforcers may have to initiate more actions and commit more resources to enforcement just to achieve the same level of environmental improvement through enhanced compliance.²²¹ In addition, data relevant to compliance status may not be available to the same extent for small as for larger sources,²²² making it more difficult to enforce against those sources, or at least more expensive as agencies must amass a data base that does not exist or is incomplete.²²³

²¹³ See *supra* note 175.

²¹⁴ Cf. OIG, *Limited Knowledge*, *supra* note 89, at 14 (reporting that, in multiple program areas, "OECA does not know the cumulative effects of pollution from small entities"). The OIG also reported that small quantity hazardous waste generator inspections may be "some of the most environmentally significant activities that regions and States conduct." *Id.*

²¹⁵ *Id.* at 6; see also *id.* at 14 ("In most program areas in our sample, OECA does not know the cumulative effects of pollution from small entities.").

²¹⁶ *Id.* at 11.

²¹⁷ EPA, CWAP, *supra* note 96, at 3 ("28 states (and 4 territories and the District of Columbia) . . . show a rate of serious noncompliance at these facilities of around 45 percent; states report taking enforcement action against less than six percent of these facilities with a serious noncompliance problem."); see also Environmental Protection Agency, OIG, *Limited Knowledge*, *supra* note 89, at 11 (concluding that it is important to know the cumulative impact of small entities to "help OECA better prioritize where to focus resources and facilitate effective management").

²¹⁸ EPA, CWAP, *supra* note 96, at 3 ("EPA and states need consistent, national data to be able to formulate appropriate strategies for ensuring compliance from [small] facilities, and to target enforcement resources to the sources most affecting water quality.").

²¹⁹ Electronic Reporting Rule, 80 Fed. Reg. 64,064 (Oct. 22, 2015).

²²⁰ 80 Fed. Reg. at 64,065, 64,079-64,081 (reporting that new rule would increase number of permit holders on which states had to provide data to EPA from approximately 46,000 to 400,000 entities).

²²¹ Cf. Bradley C. Karkkainen, *Environmental Lawyering in the Age of Collaboration*, 2002 WIS. L. REV. 555, 560 ("The remaining non-compliance cases often involve either smaller targets or more difficult problems of proof, making them costlier and riskier to litigate.").

²²² EPA, CWAP, *supra* note 96, at 3 (noting that due to absence of discharge monitoring reports, EPA lacked a national rate for significant noncompliance for smaller facilities).

²²³ See, e.g., OIG, *Limited Knowledge*, *supra* note 89, at 8 (discussing absence of reliable data on programs such as CAA regulation of minor stationary sources and regulation of small quantity generators under RCRA).

IV. EPA's Next Gen Framework

As summarized above, EPA's efforts have been subject to very substantial criticisms, including pointed criticism by its own leaders,²²⁴ covering the gamut of enforcement and compliance promotion activity since the agency's creation more than 50 years ago.²²⁵ The agency has experimented over the years with ways to re-orient and upgrade its compliance efforts and those of its state partners.²²⁶ Some of these efforts have encountered strong resistance even from within EPA, a manifestation of the complexity of large organizations such as EPA.²²⁷ Several, including some of the most publicized, have not survived or have not achieved hoped for objectives.²²⁸

EPA's recent launching of another experiment in enforcement governance, known as Next Generation Compliance, was motivated by the agency's view that, because of contemporary challenges, "[e]nvironmental compliance today requires a change just as dramatic as the one Bill Ruckelshaus [EPA's first Administrator] led over 40 years ago."²²⁹ Next

²²⁴ See, e.g., Press Release, *supra* note 108; *supra* notes 90-100, 106-11 and accompanying text.

²²⁵ See *supra* Part II. We are not suggesting that EPA does not frequently offer high praise for its enforcement efforts, which it has done regularly over the years as well.

²²⁶ For book length treatments, see, e.g., RECHTSCHAFFEN & MARKELL, *supra* note 128; JOEL A. MINTZ, ENFORCEMENT AT THE EPA: HIGH STAKES AND HARD CHOICES 161 (Univ. of Texas Press 2012) (revised edition); see also U.S. ENVTL. PROTECTION AGENCY, ENVIRONMENTAL RESULTS THROUGH SMART ENFORCEMENT, FY 2002 ENFORCEMENT AND COMPLIANCE ASSURANCE ACCOMPLISHMENTS REPORT 5 (2003), <http://nepis.epa.gov/Exe/ZyPDF.cgi/500005AN.PDF?Dockey=500005AN.PDF> (discussing EPA's "Smart Enforcement" initiative, which aimed to make enforcement more efficient and maximize environmental benefits); Joel A. Mintz, "Treading Water": A Preliminary Assessment of EPA Enforcement During the Bush II Administration, 34 ENVTL. L. REP. 10933 (Oct. 2004).

²²⁷ Granta Y. Nakayama, *New Paradigms for Enforcement: A Walk Down Memory Lane*, 2014 ABA SEC. OF ENV'T, ENERGY, & RESOURCES 5 (Mar. 2014), http://www.americanbar.org/content/dam/aba/events/environment_energy_resources/2014/03/43rd-spring-conference/conference_materials_portal/15-nakayama_grant-paper.authcheckdam.pdf. (noting that, "[w]hile it would seem hard to argue with the general goals of Smart Enforcement, this effort nonetheless has met with resistance from other parts of the Agency"); MINTZ, *supra* note 224, at 161.

²²⁸ Granta Y. Nakayama, *supra* note 226, at 5 (summarizing EPA's "Smart Enforcement" reform initiative early in the 21st century and the obstacles such reforms faced); Jonathan H. Adler, *Dynamic Environmentalism & Adaptive Management: Legal Obstacles and Opportunities* J.L. ECON. & POL'Y 133, 149 (2015) (discussing Clinton Administration's short-lived efforts to facilitate state-level experimentation); see also U.S. GOV'T ACCOUNTABILITY OFFICE, ENVIRONMENTAL PROTECTION: OVERCOMING OBSTACLES TO INNOVATIVE STATE REGULATORY PROGRAMS 3 (2002), <http://www.gao.gov/new.items/d02268.pdf> (finding that states faced "cultural resistance" from EPA officials, largely in the form of time- and resource-consuming reviews, when they sought to innovate); Thomas E. Caballero, *Project XL: Making It Legal, Making It Work*, 217 STAN. ENVTL. L.J. 390, 401 (1998) (noting absence of significant results from Project XL, "despite apparent industry enthusiasm for regulatory flexibility"); Joyce M. Martin & Kristina Kern, *The Seesaw of Environmental Power from EPA to the States: National Environmental Performance Plans*, 9 VILL. ENVTL. L.J. 1, 23-26 (1998) (stressing statutory and regulatory obstacles to innovation under the National Environmental Performance System); Barry Rabe, *Environmental Policy and the Bush Era: The Collision Between the Administrative Presidency and State Experimentation*, 37 PUBLIUS 413 (2007) (concluding that the Bush Administration had little interest in fostering state experimentation).

²²⁹ Giles, *supra* note 18, at 22. As suggested in Part IIIB.1 above, "[b]udget uncertainties and constrained resources only reinforce the imperative to move forward with Next Generation Compliance." U.S. ENVTL. PROTECTION AGENCY, NEXT GENERATION COMPLIANCE: STRATEGIC PLAN 2014-2017, 3-7 (2014), <http://www2.epa.gov/sites/production/files/2014-09/documents/next-gen-compliance-strategic-plan-2014-2017.pdf> [hereinafter EPA, NGC 2014-2017].

Generation Compliance is intended to produce that dramatic transformation and provide a “new paradigm” for enforcement.²³⁰ This part reviews the premises underlying Next Gen and the key elements of the initiative as EPA has described them as a foundation for the next part’s evaluation of how our framework for regulatory design may enhance agency efforts to respond to regulatory dynamism through initiatives such as Next Gen.²³¹

A. EPA’s Key Premises in Launching “Next Generation Compliance”

EPA’s Assistant Administrator for Enforcement, Cynthia Giles, announced the agency’s launching of its Next Generation Compliance program in 2013.²³² Giles suggested that the new initiative was intended to transform EPA’s enforcement efforts.²³³ Giles pointed out that the agency faced significant challenges and, while “tough enforcement” would remain an “essential part of our enforcement work. . . , [w]e can accomplish even more by moving our compliance programs into the 21st century.”²³⁴ This new approach would take advantage of new monitoring and information technology and “us[e] what we have learned about compliance to make it easier to comply than to violate.”²³⁵

²³⁰ EPA, NGC 2014-2017, *supra* note 228. Not everyone perceives Next Gen as the transformative effort being touted by EPA. One commentator has suggested, for example, that

Next Generation Compliance goals, many of which rely on technological advances, have not been perceived as a paradigm shift by the regulated community. . . . The primary innovation is to improve its data collection and management systems and make that data more readily available to the public. This is not a paradigm shift to a new approach to environmental enforcement. It is simply an acknowledgement that EPA can do its job better and more efficiently by modernizing its data collection and management functions.

Nakayama, *supra* note 226, at 5-6. *See also* Zacaroli, *supra* note 66.

²³¹ We explore the details of the Next Gen initiative, and EPA’s progress to date in implementing it, more thoroughly in our second article on regulatory design in the face of dynamic governance challenges. *See* Markell & Glicksman, *supra* note 7.

²³² Giles, *supra* note 18. For more on the history that led to the launching of Next Gen, see, e.g., EPA, STRATEGIC PLAN 2014-2017, *supra* note 228, at 3-7 (noting that it “builds on several innovative efforts like the Clean Water Act Action Plan”); U.S. ENVTL. PROTECTION AGENCY, OFFICE OF ENFORCEMENT & COMPLIANCE ASSURANCE, OECA NATIONAL PROGRAM MANAGER GUIDANCE FY 2014, at 2 (2013), <http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100H18X.txt> (“OECA is investing in a new paradigm called Next Generation Compliance (Next Gen) to improve compliance and reduce pollution.”); GAO, *Strategic Plan*, *supra* note 95, at 2-4 (stating that Next Gen “remains in the early stages of development” and referencing background documents on its creation); Cynthia Giles, *Next Generation Compliance*, 45 ENVTL. L. REP. 10205 (2015) (also reviewing Next Gen) [hereinafter Giles, ELR].

²³³ Giles, *supra* note 18, at 26.

²³⁴ *Id.* at 22. EPA put it as follows:

The health and environmental benefits envisioned by our statutes, regulations, and state and tribal programs are not being fully achieved. Although the available data is incomplete, high noncompliance is evident in much of the data we do have. State and federal resources for onsite compliance assistance, individual inspections, and enforcement actions are not adequate to address the large universe of regulated sources, especially the numerous small sources that are important contributors to environmental problems. . . . Field operations and EPA regulations must consider emerging approaches and technology to be effective and efficient. Together with the program offices, regions, and states, OECA is developing and will implement a new paradigm called Next Generation Compliance, which takes advantage of advances in emissions monitoring and information technology.

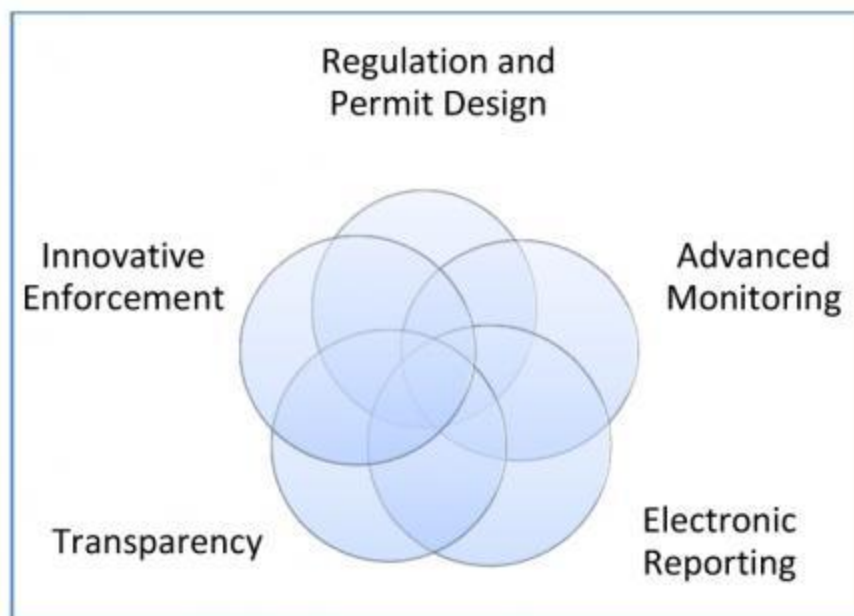
OECA 2014, *supra* note 231, at 10.

²³⁵ Giles, *supra* note 18, at 22.

B. Key Elements of Next Generation Compliance

EPA's conceived of its Next Gen strategy as constituting five, inter-related key elements, as illustrated in Figure 2.²³⁶ As is apparent from the discussion below, EPA's conceptual framework reflects its determination that effective compliance promotion requires much more than the traditional enforcement work of identifying significant violations followed by timely and appropriate enforcement response.

Figure 2



1. Regulation and Permit Design (“Rules with Compliance Built In”)²³⁷

The notion of “rules with compliance built in” reflects EPA’s recognition that the nature and content of regulatory requirements affect compliance.²³⁸ Rules that establish clear expectations, for example, are more likely to be complied with than rules that are unclear.²³⁹ One approach is to design regulations that “regulate upstream” by selecting a point in the supply chain where there are a smaller number of producers, rather than large numbers of users or

²³⁶ This figure is EPA’s. See U.S. Env’tl. Protection Agency, Next Generation Compliance, <http://www2.epa.gov/compliance/next-generation-compliance> [hereinafter EPA, NGC].

²³⁷ In some publications, EPA uses Regulation and Permit Design to capture this first element; in others it uses “Rules with Compliance Built in.” Compare EPA, NGC, *supra* note 235, with Giles, *supra* note 18, at 22.

²³⁸ EPA is in good company in recognizing that rule clarity makes compliance more likely. See, e.g., Int’l Network for Env’tl. Compliance & Enforcement, *Creating Environmental Laws and Requirements that are Enforceable* (1992), <http://www.inece.org/principles/ch3.pdf>.

²³⁹ Giles, *supra* note 18, at 24 (“One of the principles we have learned over the years of hard experience is that compliance is better when the rules are simple and clear.”); see also Nakayama, *supra* note 226, at 5 (arguing that “[c]lear and easily understood rules . . . will inevitably result in higher compliance rates. Rules for which a regulated party’s compliance status can be easily determined by the regulatory agency also achieve higher compliance rates. Agency personnel . . . can focus on the easily identified entities that are not in compliance.”).

consumers.²⁴⁰ The smaller the size of the regulated universe, the easier it will be for federal and state regulators to communicate regulatory responsibilities and oversee compliance. A smaller regulatory cohort also may have better capacity to comply than a larger, dispersed regulatory community. As an example, Administrator Giles points to a regulation that places responsibility on the auto manufacturers for installation of air emissions control equipment and certification that cars meet required emissions control standards, not on individual car owners.²⁴¹

2. Advanced Monitoring

A second element of Next Gen is promotion of advanced monitoring.²⁴² Monitoring compliance with environmental requirements is a foundational feature of effective governance.²⁴³ Despite the importance of the monitoring function, assessments over the years have highlighted critical deficiencies.²⁴⁴ Recent reviews across multiple EPA programs suggest that monitoring deficiencies continue to pose significant challenges to effective enforcement.²⁴⁵

²⁴⁰ Email from David Hindin, EPA Senior Policy Director for Innovation & Next Generation Compliance, to David L. Markell, Steven M. Goldstein Professor of Law, Fla. St. U. Coll. of Law (July 20, 2015) (on file with author).

²⁴¹ Giles, *supra* note 18, at 23. As Giles notes, second order compliance challenges include ensuring that sources are operating their pollution control equipment properly. *Id.* She points to rules that provide for third-person compliance certifications and public disclosure of compliance information as other ways to write rules that will promote compliance. *Id.* See also Vandenberg, *supra* note 82, at 148-51 (discussing third-party certification systems in forestry and aquaculture). Upstream approaches do not always operate to eliminate compliance issues. See William Funk, *Regulation by Litigation: Not so Bad, Regulation & Governance*, 5 REG. & GOVERNANCE 275, 276 (2011) (noting that large makers of diesel engines for semi trucks were caught using a computer defeat mechanism that shut off pollution controls when on the road but not during emissions testing). Volkswagen was caught, and admitted to using, similar software. See Coral Davenport & Jack Ewing, *VW Is Said to Cheat on Diesel Emissions; U.S. to Order Big Recall*, N.Y. TIMES, Sept. 18, 2015, <http://www.nytimes.com/2015/09/19/business/volkswagen-is-ordered-to-recall-nearly-500000-vehicles-over-emissions-software.html>.

²⁴² Giles, *supra* note 18, at 24. For a recent assessment, see Ralph Smith, *Detect Them Before They Get Away: Fenceline Monitoring's Potential to Improve Fugitive Emissions Management*, 28 TUL. ENVTL L.J. 433 (2015).

²⁴³ Monitoring is critical not only to assess and promote compliance, but also more generally to provide insights into the adequacy of the underlying regulatory regime and detect gaps in regulatory coverage. See, e.g., Eric Biber, *The Problem of Environmental Monitoring*, 83 U. COLO. L. REV. 1, 14-15 (2011) (arguing that monitoring can serve as “a ‘meta’ tool that helps us choose whether and how to regulate. Within any regulatory program, monitoring can help determine whether regulatory standards should be strengthened or relaxed for known harms.”).

²⁴⁴ Monitoring methods for stack emissions (which are air pollutant emissions from stationary sources, such as industrial stacks) have advanced considerably in recent years and are relatively mature. Monitoring methods for “fugitive emissions,” which EPA has referred to as “uncontrolled process emissions,” are much less well understood. See U.S. ENVTL. PROTECTION AGENCY, OFFICE OF THE CHIEF FIN. OFFICER, TECHNOLOGY MARKET SUMMIT: CASE STUDY PRIMER FOR PARTICIPANT DISCUSSION: FENCELINE AIR QUALITY MONITORING (2012), <http://nepis.epa.gov/Exe/ZyNET.exe/P100EDIT.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2011+Thru+2015&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C11thru15%5CTxt%5C00000004%5CP100EDIT.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&De fSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL> [hereinafter EPA, FENCELINE PRIMER].

²⁴⁵ See U.S. Government Accountability Office, *Grants Management: EPA Has Opportunities to Improve Planning and Compliance Monitoring*, GAO-15-618 (Aug. 2015), <http://www.gao.gov/products/GAO-15-618> (discussing the need to explain how grants compliance monitoring relates to enforcement); OIG, *Reduce Risk*, *supra* note 139; U.S.

EPA's goal through Next Gen is to enhance advanced monitoring, as well as electronic reporting and transparency (discussed below), through research and development and other efforts.²⁴⁶ Significant aims include enabling sampling in areas where it does not occur now (*e.g.*, at facility fence-lines)²⁴⁷ and development of reliable monitoring technology that is widely accessible at low cost so that citizens as well as government officials and regulated parties can participate in monitoring. The three goals outlined in EPA's Draft Roadmap for Next-Generation Air Monitoring, published in 2013, embody this agenda:

- Promote development of affordable near-source fence-line monitoring technologies and sensor network-based leak detection systems . . . ;
- Supplement air quality monitoring networks through development of low-cost, reliable air quality monitoring technology. . . ; and
- Support environmental justice communities and citizen efforts to measure air pollution in local areas.²⁴⁸

Additional, more accurate, and more timely data has the potential to dramatically enhance governments' capacity to uncover pollution and violations on a real-time basis. Giles suggests that advances in monitoring capacity are "contributing to a revolution in how we find and fix pollution problems."²⁴⁹ An example is the use of cell phone technology. As Giles has explained, "in one much-used river, EPA has installed solar powered continuous monitoring devices that upload via cell phone technology to agency computers."²⁵⁰ Improved monitoring capacity is also making it possible to identify pollution that previously was unknown – it is making "previously invisible pollution visible."²⁵¹ Giles expresses the hope that advanced monitoring technologies "can help make [traditional monitoring challenges] obsolete."²⁵² In EPA's view, in short, this dramatic recasting of monitoring capacity has the potential to revolutionize how EPA seeks to

EPA, Office of Inspector General, *EPA Needs to Track Whether Its Municipal Settlements for Combined Sewer Overflows Benefit Water Quality*, Project No. 15-P-0280 (Sept. 16, 2015).

²⁴⁶ See *infra* Part IVB.3-4. EPA suggests that advancing fenceline monitoring will generate benefits that include working with the private sector to establish new monitoring methods transparently; enhancing certainty by establishing clear regulatory requirements that will be in place early enough to justify investments; reducing reporting burdens while collecting better data; encouraging facilities to show they are operating within permit limits and increasing certainty about which emissions are contributing to ambient problems; and encouraging state and local agency flexibility and experimentation. EPA, FENCELINE PRIMER, *supra* note 243.

²⁴⁷ EPA defines fenceline monitoring as "the measurement of air pollution at industrial facilities and site remediation boundaries," and notes that the "techniques and instruments for fenceline monitoring can also be used inside of facility boundaries to monitor air pollutant levels near key process units." EPA, FENCELINE PRIMER, *supra* note 243, at 1.

²⁴⁸ U.S. ENVTL. PROTECTION AGENCY, DRAFT ROADMAP FOR NEXT-GENERATION AIR MONITORING 2 (2013), http://www.eunetair.it/cost/newsroom/03-US-EPA_Roadmap_NGAM-March2013.pdf.

²⁴⁹ Giles, *supra* note 18, at 24.

²⁵⁰ *Id.*

²⁵¹ *Id.*; see also EPA, FENCELINE PRIMER, *supra* note 243, at 2-7 (summarizing variations of fenceline monitoring and advantages and challenges, including market-based, technology, and financial issues). Advancing fenceline monitoring is one facet of EPA's larger "roadmap" for technology innovation. U.S. ENVTL. PROTECTION AGENCY, TECHNOLOGY INNOVATION FOR ENVIRONMENTAL AND ECONOMIC PROGRESS: AN EPA ROADMAP, <http://www.epa.gov/envirfinance/innovation.html>.

²⁵² Giles, *supra* note 18, at 24. EPA suggests that streamlined and flexible industrywide fenceline monitoring requirements "could pave the way for a larger fenceline monitoring technology market." EPA, FENCELINE PRIMER, *supra* note 243, at 4.

promote compliance through the various legal mechanisms (such as rulemaking, permitting, and enforcement) available to it.²⁵³

EPA's hope is that such data will also facilitate regulated party efforts to identify and resolve issues.²⁵⁴ Further, it expects that the dramatic increase in the availability of monitoring technology, as purchase prices drop, will increase public use significantly and enhance communities' understanding of pollution-related concerns. As a result, advanced monitoring has the potential to impact significantly the roles regulated parties and civil society can play in improving compliance. Increased accessibility of data, combined with the increasing mobility and accuracy of new technology and its capacity to provide real-time results, will, in Giles's view, "encourage more direct industry and community engagement," and may "reduce the need for government action."²⁵⁵

3. Electronic Reporting

Electronic reporting is a third key element of EPA's Next Gen initiative. EPA's effort in this realm is geared towards having regulated parties report compliance-related information electronically, rather than on paper.²⁵⁶ Electronic reporting has the potential to be much faster and more accurate compared to paper reports that need to be entered manually onto a computer.²⁵⁷ Data problems have been an Achilles heel for effective compliance for decades, as a series of GAO and EPA OIG reports have detailed.²⁵⁸ As Giles has acknowledged:

[M]uch of the information reported to EPA and states by facilities is still submitted on paper, and waits for a government employee to manually enter the data into computer systems. Or, in a time of declining budgets, the paper sits in a corner unopened, until someone has time to examine the data and see if any violations appear likely. . . . Errors can be introduced through manual data entry. . . .²⁵⁹

²⁵³ For more skeptical views, see, e.g., Nakayama, *supra* note 226.

²⁵⁴ Giles, *supra* note 18, at 24. Better and more real-time data may motivate regulated parties to reduce emissions because they "want to do the right thing;" want to limit impacts and potential liability; want to limit securities-related issues; are concerned about a regulatory response; or are concerned about citizen reactions. For example, Volkswagen's stock value plunged by nearly 20 percent immediately following the Justice Department's announcement that it had violated the Clean Air Act by installing "defeat devices" on its diesel models between 2009 and 2015. Thad Moore, Anthony Faiola & Sari Horowitz, *Fallout Comes Fast for Volkswagen*, WASH. POST, Sept. 22, 2015. As we discuss in our second article on *Dynamic Governance*, *supra* note 7, advanced monitoring also has the potential to transform state-federal relations. It also can equip Congress and the Executive, and the courts in some cases, with the capacity to exercise their powers to oversee EPA's administration of regulatory programs in a more informed way.

²⁵⁵ Giles, *supra* note 18, at 24.

²⁵⁶ EPA's ambitions for electronic reporting extend beyond simply transferring reporting from a paper to an electronic medium. This facet of EPA's Next Generation initiative is closely linked to its larger E-Enterprise for the Environment initiative, which is a joint EPA-state effort. See E-ENTERPRISE LEADERSHIP COUNCIL, E-ENTERPRISE FOR THE ENVIRONMENT CONCEPTUAL BLUEPRINT: EXECUTIVE SUMMARY (Jan. 2014), http://www.exchangenetwork.net/ee/EEnterprise_Conceptual_Blueprint_013114_Executive_Summary.pdf.

²⁵⁷ Giles, *supra* note 18, at 25.

²⁵⁸ See Markell, *Slack*, *supra* note 14, at 63.

²⁵⁹ Giles, *supra* note 18, at 25.

Giles notes that “E-reporting is a solution that saves time and money while improving results.”²⁶⁰ She notes that it will also create greater transparency by dramatically improving accessibility of compliance information.²⁶¹

4. Increased Transparency

EPA identifies “increased transparency” as the fourth key feature of its Next Gen approach. Giles suggests that “[u]sing transparency as a way to improve performance is one of the most important things we have learned about strategies to improve compliance. . . [and, further, that] EPA’s efforts to make our data more available are only starting to scratch the surface of the ways transparency can improve results.”²⁶² She notes that information must be “important and correct” for transparency to work; hence, transparency goes hand in hand with the related Next Gen features of advanced monitoring and electronic reporting.²⁶³ Giles highlights several ways in which improved transparency could produce improved compliance and better environmental results – including serving as a “reminder” to regulated parties of problems and of their performance relative to the competition; and also as a reminder to government officials and the public of the absolute and relative performance of different members of the regulated community.²⁶⁴

5. Innovative Enforcement Strategies

“Innovative enforcement strategies” is the fifth and final Next Gen element. Giles identifies an array of innovative approaches that will enhance compliance, many of which are byproducts of the first four Next Gen elements. She suggests, for example, that advanced monitoring will help EPA better identify violators and target enforcement.²⁶⁵ Electronic reporting will also save money for both regulated parties and government.²⁶⁶ Further, Giles suggests that by “shifting . . . into the electronic age,” states can improve their performance, gain additional flexibility in the state-federal relationship, and better serve as laboratories of experimentation.²⁶⁷ She also notes that third-party verification of compliance efforts and status will improve compliance and conserve government resources.²⁶⁸ In addition, Giles notes that

²⁶⁰ *Id.*

²⁶¹ *Id.* We discuss each element, including the concerns various stakeholders have raised about them, in Part V below and in Part II of our exploration of *Dynamic Governance*, *supra* note 7.

²⁶² Giles, *supra* note 18, at 25.

²⁶³ *Id.* at 26.

²⁶⁴ *Id.*

²⁶⁵ *Id.*

²⁶⁶ *Id.*

²⁶⁷ *Id.* For a review of state innovations in the compliance promotion arena, including some innovations such as third-party verification touted by Giles, see David L. Markell, *States as Innovators: It’s Time for a New Look to our “Laboratories of Democracy” in the Effort to Improve our Approach to Environmental Regulation*, 58 ALB. L. REV. 347 (1994).

²⁶⁸ Sounding another skeptical note, one commentator has suggested that third-party verification is “so last generation” and, while it may have been innovative in the 1970s, it is no longer so. Seth Jaffe, *Coming Soon to a Settlement Near You: Next Generation Compliance*, LAW & THE ENV’T, Jan. 26, 2015, <http://www.lawandenvironment.com/2015/01/26/coming-soon-to-a-settlement-near-you-next-generation-compliance/>. For reviews of third-party verification regimes and their design, see, e.g., McAllister, *supra* note 182, at 22-23 (discussing need for auditor independence and competence).

“better, more accurate information” will enable EPA and others to learn more about the effectiveness of different compliance promotion strategies – it will “encourage evidence-based experimentation to find out which strategies work to improve compliance and which do not.”²⁶⁹ There is still much to be learned about the effectiveness of different enforcement strategies in different contexts, and an information-rich environment will help shed light on questions that scholars and others have been unable to answer because of historical gaps in the available data.²⁷⁰ Giles concludes that, while “[v]igorous enforcement . . . will always be the backbone of environmental protection, [a]s we continue to learn about ways to strengthen compliance, and take advantage of advances in technology, Next Gen can transform our protection work”²⁷¹

V. The Insights Provided by Focusing on Actors, Mechanisms, and Tools

As Part III above indicates, EPA faces a series of challenges in regulatory enforcement as a result of the dynamic regulatory environment in which it operates. The agency has developed a “new paradigm,” its Next Gen initiative, to improve governance and outcomes in the face of those challenges, as described in Part IV. As EPA conceptualizes this new governance paradigm, it has five key elements: (1) rules with compliance built in; (2) advanced monitoring; (3) electronic monitoring; (4) increased transparency; and (5) innovative enforcement strategies.

Our claim in this article is not that these are inappropriate elements to consider in making governance decisions. Instead, we argue that our conceptual framework – under which policy designers would consider the full range of actors, mechanisms, and tools available to advance policy in a particular arena – helps to ensure that policy designers, such as the enterprising EPA officials who have launched Next Gen, consider and integrate the full range of variables that have the potential to contribute to effective governance in pursuing new paradigms to address dynamic circumstances.²⁷² In this part we illustrate the value of our framework by assessing how analysis of the role of one set of actors, citizen actors, may shape redesign of regulatory enforcement structures and initiatives in response to dynamic circumstances.²⁷³

²⁶⁹ Giles, *supra* note 18, at 26.

²⁷⁰ See, e.g., Wayne B. Gray & Jay P. Shimshack, *The Effectiveness of Environmental Monitoring and Enforcement: A Review of the Empirical Evidence*, 5 REV. ENVTL. ECON. & POL’Y 3 (2011); RECHTSCHAFFEN & MARKELL, *supra* note 128, at ____.

²⁷¹ Giles, *supra* note 18, at 26.

²⁷² We have not seen the challenges of the administrative state contextualized in precisely this way and welcome challenges to this conceptualization. Others have framed the key features of regulatory governance differently. See, e.g., Mamiko Yokoi-Arai, *The Regulatory Efficiency of a Single Regulator in Financial Services: Analysis of the UK and Japan*, 22 BANKING & FIN. L. REV. 23, 27 (2006) (defining public sector governance as “the traditions and institutions that determine how authority is exercised in a particular country,” including “(1) the process by which governments are selected, held accountable, monitored, and replaced; (2) the capacity of government to manage resources efficiently and to formulate, implement, and enforce sound policies and regulations; and (3) the respect of citizens and the state for the institutions that govern economic and social interactions among them”); Richard B. Stewart, *Remedying Disregard in Global Regulatory Governance: Accountability, Participation, and Responsiveness*, 108 AM. J. INT’L L. 211, 212 (2014) (identifying “the institutional mechanisms and structures of global regulatory decision making, and presenting “a new taxonomy of governance mechanisms, distinguishing three basic types – decision rules, accountability mechanisms, and other regard-promoting measures”); Lesley K. McAllister, *Harnessing Private Regulation*, 3 MICH. J. ENVTL. & ADMIN. L. 291, 299 (2014) (identifying three “aspects” of regulation – rule creation, rule implementation, and rule enforcement).

²⁷³ We address the other key actors, key mechanisms, and key tools in our accompanying article, *Dynamic Governance, Part II*, *supra* note 7.

A. Capacity and Coordination in Integrating Civil Society Roles

We suggest that the role that a policy regime should create for citizens depends on at least two key issues, the absolute and relative capacities of citizens, government officials, and regulated parties to perform functions that advance regulatory goals, and the degree to which actions by different actors (in this context especially government and citizens) can be coordinated.²⁷⁴ Citizens' *capacity* implicates the extent to which civil society has the wherewithal (including financial, technical, level of commitment, and ability to overcome collective action problems) to undertake particular tasks. *Coordination* is a critical feature of enhanced citizen involvement because members of civil society may be motivated by private interests that diverge from the "public interest," however that is defined, which suggests the need to consider various forms of gatekeeping and other constraints on citizen action.²⁷⁵ Further, even if civil society's interests are aligned perfectly with the "public interest" (which is unlikely), the introduction of a multiplicity of "civil society actors" creates significant coordination challenges.²⁷⁶

B. Civil Society's Entry Points in Environmental Enforcement and Compliance

This section considers the implications of these capacity and coordination questions in the context of four types of civil society engagement. The discussion illustrates how our framework can help identify and illuminate policy choices that may contribute to effective regulatory programs, including the enforcement and compliance structures that EPA's Next Gen initiative is designed to overhaul.²⁷⁷

First, federal laws provide a multitude of entry points for civil society into *environmental actions undertaken by the government*. This is obviously the case in rulemaking, which features opportunities to participate before a regulation is proposed (including petitioning an agency to

²⁷⁴ We invite others to add to these variables, and recognize that they include treatment of issues such as procedural justice.

²⁷⁵ See, e.g., Engstrom, *supra* note 15, at 634-37 (discussing coordination issues arising from private enforcement efforts, such as "piggybacking" on public enforcement and disrupting relationships between regulators and their targets); see also Michael Greve, *Private Enforcement, Private Rewards: How Environmental Citizen Suits Become an Entitlement Program*, in ENVIRONMENTAL POLITICS: PUBLIC COSTS, PRIVATE REWARDS, 105-28 (Michael S. Greve & Fred L. Smith, Jr. eds., 1992).

²⁷⁶ The risks include over-deterrence and inconsistent treatment of similarly situated parties. See, e.g., Atlantic States Legal Found., Inc. v. Eastman Kodak, Co., 933 F.2d 124, 127-28 (2d Cir. 1991) (stating that a citizen suit may not "supplant state enforcement," and that once the government has reached a settlement the citizen suit cannot continue merely because the citizens have different views about appropriate relief). Cf. Sierra Club, Lone Star Chapter v. Cedar Point Oil Co. Inc., 73 F.3d 546, 569 n.37 (5th Cir. 1996) (concluding that "courts should exercise restraint" in addressing citizen suit alleging a discharge in violation of the CWA for which EPA has not adopted a permit or limitation due to lack of resources or low prioritization); Wisconsin's Envtl. Decade, Inc. v. Wisconsin Power & Light Co., 395 F. Supp. 313, 319 (E.D. Wis. 1975) (discussing legislators' fears that allowing citizen suits against the Secretary of Health, Education, and Welfare to require enforcement action "might have the effect of distorting the agency's enforcement priorities").

²⁷⁷ Other types of engagement are also available. For example, citizens have played a role in encouraging companies to reduce emissions and other releases subject to reporting under the Toxic Release Inventory (TRI) program. See, e.g., Katrina Fischer Kuh & David Markell, *Informational Regulation, the Environment, and the Public* (forthcoming 2016); Vandenbergh, *supra* note 82, at 129.

create a rule), submit comments during the rulemaking process, and challenge in court a rule when it is finalized.²⁷⁸ In permitting, citizens have an opportunity to comment on a draft permit;²⁷⁹ as in the rulemaking setting, citizens may also have an opportunity to participate before that point and to challenge a final permit.²⁸⁰ In some cases, citizens may have an opportunity to participate in agency-initiated enforcement proceedings as well, to provide comments before a settlement is finalized, and to challenge a proposed settlement.²⁸¹ In addition to these venues, EPA has established processes to engage citizens, including obtaining citizen input more generally.²⁸²

Dramatic improvements in data technologies (greater amounts of collected data and more accurate, timely, and accessible data) and communication technologies have significant potential to increase civil society's capacity to contribute through these entry points. As a result, policy design efforts should consider how to help bolster citizen capacity to take advantage of these technological and other advances, as well as to structure these entry points to enable and encourage citizen participation.²⁸³ However, policy design should also consider risks that such advances may create. For example, apparent increases in citizen capacity may amount to less than meets the eye if the data are problematic because of concerns about their accuracy or the absence of important contextual information.²⁸⁴ Indeed, such advances may pose coordination challenges if they overload the system and divert agency officials from higher priorities. Risks that newly available information may confuse or mislead citizens and thereby prompt citizen

²⁷⁸ 5 U.S.C. §§ 553(b)-(c), (e) (2012); *id.* §§ 702, 704; *Massachusetts v. EPA*, 549 U.S. 497 (2007) (discussing the right of citizens to petition an agency to develop a rule and then to challenge in court an agency's decision not to proceed).

²⁷⁹ *See, e.g.*, 40 C.F.R. §§ 71.11(a)(5), 124.10-124.12

²⁸⁰ *See, e.g.*, 40 C.F.R. § 124.19; 5 U.S.C. §§ 702, 704 (2012).

²⁸¹ *See, e.g.*, 40 C.F.R. pt. 22; John C. Cruden & Bruce S. Gelber, *Federal Civil Environmental Enforcement: Process, Actors, and Trends*, 18 NAT. RESOURCES & ENV'T 10 (2004).

²⁸² EPA has developed citizen involvement plans, community participation plans, and other strategies to provide information to citizens, solicit citizen input, and otherwise enhance citizens' capacity to weigh in on activities that may implicate environmental or health concerns. EPA's Environmental Justice initiative pays particular attention to engaging citizens. *See generally* EPA FOR CITIZEN ACTION, <http://www.epa.gov/epahome/citizen.htm>. Federal advisory committees are another example. *See* FEDERAL ADVISORY COMMITTEES AT EPA, <http://www2.epa.gov/faca> (last visited July 29, 2015). One of the co-authors served on such an EPA committee for several years.

²⁸³ The procedural justice literature offers insights into the value of citizen participation and how to structure it to advance procedural justice. *See, e.g.*, David L. Markell & Tom R. Tyler, *Using Empirical Research to Design Government Citizen Participation Processes: A Case Study of Citizen's Roles in Environmental Compliance and Enforcement*, 57 U. KAN. L. REV. 1, 24 (2008) (discussing reasons that citizens value procedures); David L. Markell, et al., *What Has Love Got to Do with It?: Sentimental Attachments and Legal Decision-Making*, 57 VILL. L. REV. 209, 212-13 (2012) (discussing features of procedural justice, particularly the positive effects when judges inform the public of their rights and give them an opportunity to speak); *see also* Tom R. Tyler & David L. Markell, *The Public Regulation of Land Use Decisions: Criteria for Evaluating Alternative Procedures*, 7 J. EMPIRICAL LEGAL STUDIES 538, 544 (2010) (suggesting that procedural injustices may be alleviated where governments consider public opinion).

²⁸⁴ The TRI program, which made more data about facility pollution releases public available than ever before, has been subject to such criticisms. *See, e.g.*, Stephen M. Johnson, *Competition: The Next Generation of Environmental Regulation?*, 18 SOUTHEASTERN ENVTL. L.J. 1, 17 (2009) (describing criticism of TRI data as "incomplete, inaccurate, or confusing"); Abdallah Simaika, *The Value of Information: Alternatives to Liability in Influencing Corporate Behavior Overseas*, 38 COLUM. J.L. & SOC. PROBS. 321, 359 (2005) (describing criticism of TRI program "for providing mounds of raw, unrefined data with little instruction on its effective use").

engagement that diverts agency officials from higher priority concerns or otherwise interferes with the effective and efficient functioning of the administrative state highlights the importance of considering possible unintended consequences of initiatives intended to build capacity.²⁸⁵ Existing agency or judicial arbiters whose job it is to manage a proceeding and to make informed judgments, such as an administrative law judge (ALJ) in an enforcement proceeding,²⁸⁶ may help to mitigate unintended consequences. For other citizen entry points, modifications to agency procedures may be warranted, as agencies have begun to explore in contexts such as management of public comment on proposed regulations in response to increased capacity for mass commenting.²⁸⁷ The key point in terms of our framework is that as citizen access to information changes, it will be important for EPA to consider issues relating to capacity and coordination in structuring citizens' roles at each of these entry points into the regulatory process.

A second form of civil society engagement involves *citizen interactions with regulated parties*. For example, citizens concerned about operations at a nearby plant may contact plant officials to raise concerns and acquire information. "Good neighbor agreements" are a vehicle sometimes used to create more or less formal arrangements between neighbors and regulated parties.²⁸⁸ In some cases, these interactions may be required by legislation, as under the Clean Air Act in connection with emergency preparedness.²⁸⁹ In others, EPA may embed such an arrangement in a permit or in settlement of an enforcement case.²⁹⁰ Alternatively, citizens have

²⁸⁵ See Engstrom, *supra* note 15, at 634-37 (discussing the concern that inexperienced, or single-issue private enforcers can "generate bad precedent," which then restricts government regulators and hampers enforcement efforts that are in the public interest).

²⁸⁶ KENNETH C. DAVIS, ADMINISTRATIVE LAW TREATISE, § 8.11, at 564 (1958) (discussing methods for controlling intervention in administrative proceedings). The procedures for intervention vary by agency. Agencies that allow limited public participation generally give ALJs substantial discretion to determine its nature and extent. See, e.g., 14 C.F.R. § 13.206(b) (2012) (allowing ALJs for the Federal Aviation Administration to "determine the extent to which an intervenor may participate in the proceedings"); 16 C.F.R. § 3.14(a) (2012) (allowing Federal Trade Commission ALJs or the Commission to issue an order permitting intervention "to such extent and upon such terms as are provided by law or as otherwise may be deemed proper"). See generally ROBERT L. GLICKSMAN & RICHARD E. LEVY, ADMINISTRATIVE LAW: AGENCY ACTION IN LEGAL CONTEXT 490-95 (2010).

²⁸⁷ See, e.g., Wendy A. Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L.J. 1321, 1331, 1332 (2010) (describing how "filter failure" has allowed affected interests to submit "voluminous filings" and put agencies "at the mercy of an unlimited flood of information through various pluralistic processes," including notice and comment rulemaking); Cynthia R. Farina, & Mary J., Newhart, *Rulemaking 2.0: Understanding and Getting Better Public Participation*, CORNELL E-RULEMAKING INITIATIVE PUBLICATIONS, Paper 15 (2013), <http://scholarship.law.cornell.edu/cei/15>.

²⁸⁸ Thalia González & Giovanni Saarman, *Regulating Pollutants, Negative Externalities, and Good Neighbor Agreements: Who Bears the Burden of Protecting Communities?*, 41 ECOLOGY L.Q. 37, 39 (2014); see also Sanford Lewis & Diane Henkels, *Good Neighbor Agreements: A Tool for Environmental and Social Justice*, 23 SOC. JUST. 4, 138-39 (1996); David L. Markell & Tom R. Tyler, *Using Empirical Research to Design Government Citizen Participation Processes: A Case Study of Citizens' Roles in Environmental Compliance and Enforcement*, 57 U. KAN. L. REV. 1, 11 n.55 (2008).

²⁸⁹ 42 U.S.C. § 7412(r) (2012) (requiring certain facilities to publish Risk Management Plans and make them available to the public).

²⁹⁰ See *United States v. Murphy Oil USA, Inc.*, Civ. Action No. 3:10-cv-00563-bbc, 100 (W.D. Wis. 2010) (requiring defendant to conduct monthly meetings with a local non-profit organization to discuss citizen concerns, and provide them with a report on the progress on the Consent Decree and updated data on the refinery). EPA has published a list of the ten enforcement settlements that reflect Next Gen features. At least three of those incorporated good neighbor agreements. U.S. ENVTL. PROTECTION AGENCY, NEXT GENERATION ENFORCEMENT

sometimes worked relatively independently of agencies to negotiate such agreements.²⁹¹ These agreements may require improved access to information, regulated party commitments to reductions in pollution and development of accident response plans, and investment in community services.²⁹² Proponents of good neighbor agreements have suggested that they offer potential for innovation because the strategy is experimental; they lead to increased citizen influence over activities within community borders; and they are likely to yield predictable benefits when embodied in a binding agreement.²⁹³

New, better, and more timely information about pollutant releases and risks has the potential to transform these relationships, with significant implications for the shape of governance more generally. EPA Assistant Administrator Giles hopes that emergence of such significantly enhanced regulated party/community relationships (“interactions on steroids”) will reduce the need for government engagement as citizens and regulated party capacity and coordination improves.²⁹⁴ But, again, policy design will need to be mindful of the real-world as well as theoretical consequences of such advances in information availability. In the real world, improved capacity for such interactions between regulated entities and citizen groups may not provide the anticipated enhancements to regulatory enforcement. Authors of a recent case study of a good neighbor agreement express skepticism about the viability of “shifting the burden” of overseeing regulated parties from government officials to communities.²⁹⁵ Capacity concerns were a significant reason for this skepticism.²⁹⁶ The authors suggest that, even in relatively affluent communities, the public generally lacks the resources and technical expertise needed to accomplish the necessary comprehensive monitoring.²⁹⁷ Deputization of civil society is likely to pose coordination issues as well and process designers would be well served to consider how to address them.²⁹⁸

SETTLEMENT HIGHLIGHTS, <http://www2.epa.gov/sites/production/files/2015-01/documents/nextgen-enfsettlementhighlights.pdf> (Murphy Oil, BP Whiting, and Tyson Foods).

²⁹¹ See Janet V. Siegel, *Negotiating for Environmental Justice: Turning Polluters into “Good Neighbors” Through Collaborative Bargaining*, 10 N.Y.U. ENVTL. L.J. 147, 170–71 (2002) (stating that good neighbor agreements are “a viable tool for communities to bargain with industry for positive reforms, policies, and financial investment that protect community health and welfare while also responding to industry’s needs”).

²⁹² González & Saarman, *supra* note 287, at 40; Lewis & Henkels, *supra* note 287, at 138–45.

²⁹³ Lewis & Henkels, *supra* note 287, at 147–48.

²⁹⁴ See Giles, *supra* note 18, at 24.

²⁹⁵ González & Saarman, *supra* note 287, at 41 (concluding that “reliance on Good Neighbor . . . is misguided and detracts from the critical need for an environmental regulatory regime to take the responsibility off of communities and to adequately address the impacts of industrial pollution”).

²⁹⁶ The authors argue that good neighbor agreements can present hurdles for community activists, including bringing corporate management to the negotiating table, ensuring that the community can present a unified set of interests, and lengthy negotiations. These problems are amplified in the politically disenfranchised and historically marginalized communities where good neighbor agreements are most often considered as an alternative for addressing environmental harms. *Id.* at 62. The authors note that “[t]he American Lung Association describes the capacity for communities to complete studies of pollution exposure as ‘quite limited.’” *Id.* at 44.

²⁹⁷ González & Saarman, *supra* note 287, at 45. In its Environmental Justice materials, EPA also has highlighted capacity concerns in its assessment of community empowerment. U.S. ENVTL. PROTECTION AGENCY, PLAN EJ 2014, SUPPORTING COMMUNITY-BASED ACTION PROGRAMS 1 (2014), <http://www3.epa.gov/environmentaljustice/plan-ej/community-action.html> (noting that “we realize that far too many communities . . . lack the capacity to affect environmental conditions”). EPA’s environmental justice initiative includes efforts to build such capacity. *Id.*

²⁹⁸ Promoting coordination among public and private actors is likely to be relatively easy when a good neighbor-type arrangement is created through an agency settlement that is enforceable by the government. See *United States v.*

In short, new technologies and other advances are dramatically enhancing the possibility of improved communications and relationships between regulated parties and the communities in which they operate. As these changes develop, questions of civil society capacity and the mechanics of coordination are likely to be important parts of program design initiatives intended to empower citizens and, to a greater or lesser degree, privatize traditional government functions by empowering civil society through interactions between regulated entities and citizen representatives.

A third type of citizen engagement involves *equipping and empowering citizens to serve as fire alarms*.²⁹⁹ Because of their numbers, proximity to regulated facilities, and interest in protecting their families' health or access to clean natural resources, citizens may learn about problems before the government does, and sometimes before even the facility itself uncovers them. The literature refers to citizens providing such information to the government as a "fire alarm" function.³⁰⁰ Just as a citizen pulls a fire alarm to alert the fire department of the need for help, a citizen provides information to the government to notify the government of the need for attention.³⁰¹

In the context of this entry point, as for the two discussed above, the significant increase in publicly available information, including in some cases information that citizens themselves generate due to access to cheaper and more accurate monitoring technologies,³⁰² will inevitably dramatically increase citizens' capacity and willingness to serve as "fire alarms." Close attention to citizens' capacity, and to coordination with government enforcement efforts, will be critical as their fire alarms role expands. For example, false alarms divert scarce resources that otherwise would be devoted to higher priority activities.³⁰³ Considerable education to help citizens

Murphy Oil USA, Inc., Civ. Action No. 3:10-cv-00563-bbc, 100 (W.D. Wis. 2010) (settlement requiring Murphy Oil to install an ambient monitoring system so that the citizens had access to air pollution data in their neighborhood; make publicly available on its website meteorological and ambient monitoring data; hold monthly meetings with the public to discuss concerns and ensure transparency; and conduct community enhancement projects such as mitigating excess noise levels, fence construction, and reporting at public meetings on efforts to suppress dust caused by activities/wind on refinery property).

²⁹⁹ Hammond & Markell, *supra* note 11, at 356, 357 (noting that "[t]he classic account of fire alarms provides that they are a means of converting 'the oversight job of a politician from active monitor to reactive servant of affected constituencies,'" and that "[a]lthough the origins of the fire-alarm theory lie in a traditional principal agent conceptualization of administrative law — the theory originally focused on congressional oversight — fire alarms can provide notification to many different actors") (citing McNollgast, *Structure and Process, Politics and Policy: Administrative Arrangements and the Political Control of Agencies*, 75 VA. L. REV. 431, 434 (1989)).

³⁰⁰ See ROBERT L. GLICKSMAN & RICHARD E. LEVY, ADMINISTRATIVE LAW: AGENCY ACTION IN LEGAL CONTEXT 761 (2d ed. 2014) ("Fire alarms leverage the public's interest in compliance and reduce [government] enforcement costs, but are only effective if the public is likely to be aware of violations and has the incentive to report them."); McNollgast, *Administrative Procedures as Instruments of Political Control*, 3 J.L. ECON. & ORG. 243, 250 (1987); Matthew D. McCubbins & Thomas Schwartz, *Congressional Oversight Overlooked: Police Patrols Versus Fire Alarms*, 28 AM. J. POL. SCI. 165, 166 (1984).

³⁰¹ EPA has established a web page, Reporting Environmental Violations, <http://www2.epa.gov/enforcement/report-environmental-violations>, which covers both emergencies and whistleblower protection.

³⁰² See Snyder, et al., *supra* note 51 (discussing the status of air pollution sensor technologies and their implications for citizen science).

³⁰³ See Kal Raustiala, *Police Patrols & Fire Alarms in the NAAEC*, 26 LOY. L.A. INT'L & COMP. L. REV. 389, 410 (2004) (suggesting that one of the shortcomings of using citizens as "fire alarms" is that the participation is inherently decentralized, and because it is driven by "disconnected individual choices," enforcement can be

understand the information they generate or can access, so that they can make informed judgments about when government intervention is needed, will be essential to optimize citizens' service as fire alarms.³⁰⁴ The government may find it worthwhile to experiment with possible fire alarm mechanism features (e.g., who may pull an alarm, how it is pulled, the type of response it triggers) as it tries to calibrate use of those mechanisms in a world in which citizens have real-time access to an enormous volume of information.³⁰⁵

A fourth type of citizen engagement involves *citizens operating as direct actors through the legal process*, with citizen suits serving as the most prominent example of this direct citizen engagement.³⁰⁶ Almost all of the major environmental laws authorize citizens to bring suit in federal district court against violators under some circumstances.³⁰⁷ Congress empowered citizens to bring their own lawsuits against violators to address its concern that government resources were too limited to enable it to bring suit in all of the cases in which enforcement action is appropriate and to provide a safety net in the event of agency capture.³⁰⁸ It opened the courthouse doors to citizens so that they could pursue violators and supply deterrence beyond that stemming from government enforcement activities.³⁰⁹ Further, Congress authorized the

unfocused, reactive, and not in the collective best interest of the community).

³⁰⁴ EPA, FY 2014-2018, *supra* note 157, at 73 (noting that "sharing of critical, up-to-date information (such as skills and services, best practices and success stories, useful contacts, relevant grants and technical assistance, data, and multimedia strategies)" will be needed to encourage citizen contributions to environmental research that complements EPA research)

³⁰⁵ One of the authors has previously provided in-depth reviews of two different citizen fire alarm mechanisms in the environmental enforcement arena, one involving citizens' capacity to petition EPA to withdraw a state's authorization to administer a regulatory program based on deficient state performance, and the other involving international review of ineffectual enforcement performance. See Hammond & Markell, *supra* note 11, at 356 (discussing petition to withdraw state permitting authorization as a type of fire alarm); David Markell, *The Role of Spotlighting Procedures in Promoting Citizen Participation, Transparency, and Accountability*, 45 WAKE FOREST L. REV. 425 (2010).

³⁰⁶ For general treatment of citizen suits, see, e.g., SEAN FARHANG, *THE LITIGATION STATE: PUBLIC REGULATIONS AND PRIVATE LAW SUITS IN THE UNITED STATES* (Princeton Univ. Press 2010). For symposium treatment of citizen suits under the environmental laws specifically, see Symposium, *supra* note 17. Common law suits such as private nuisance actions are another enforcement mechanism sometimes available to citizens, either independent of or in tandem with statutory actions. See, e.g., *International Paper Co. v. Ouellette*, 479 U.S. 481 (1987) (discussing CWA preemption of state common law nuisance actions involving water pollution); *American Elec. Power Co. v. Connecticut*, 564 U.S. 410 (2011) (discussing Clean Air Act displacement of federal common law nuisance actions to abate greenhouse gas emissions).

³⁰⁷ See, e.g., 33 U.S.C. § 1365 (CWA) (2012); 42 U.S.C. § 6973 (RCRA) (2012); 42 U.S.C. § 7604 (2012) (CAA); 42 U.S.C. § 9659 (2012) (CERCLA); see also 16 U.S.C. § 1540(g) (2012) (Endangered Species Act). For a recent review, see Edward Lloyd, *Citizen Suits and Defenses against Them*, SW014 ALI-CLE 285 (Feb. 2015) (on file with authors). EPA has limited control over some of the parameters for citizen suits established by the statutes themselves, such as statutory standing requirements. But it has the ability to influence the availability of citizen suits through its own actions, such as taking enforcement action that operates to preclude a citizen suit. See, e.g., Karl S. Coplan, *Citizen Enforcement*, in *ENCYCLOPEDIA OF ENVIRONMENTAL LAW: ENVIRONMENTAL DECISIONMAKING* (Leroy C. Paddock, David L. Markell & Nicholas Bryner eds., forthcoming 2016) (on file with authors).

³⁰⁸ Karl S. Coplan, *Citizen Litigants Citizen Regulators: Four Cases Where Citizen Suits Drove Development of Clean Water Law*, 25 COLO. NAT. RESOURCES, ENERGY & ENVTL. L. REV. 61, 65 (2014) (elaborating on the development of environmental citizen suits, and on Congress' intentions when incorporating this enforcement mechanism into the Clean Air Act).

³⁰⁹ See, e.g., Megha Shah, *Grassroots Enforcement of EISA: The Need for A Citizen Suit Provision in the Energy Independence and Security Act of 2007*, 77 GEO. WASH. L. REV. 488, 497 (2009) ("[E]ven with diligent government

award of attorneys' fees to successful plaintiffs to provide incentives for citizens to bring cases.³¹⁰

At the same time, for various reasons, including concerns about coordination, Congress preserved for the government primary enforcement authority, confining citizens to a supplemental or subordinate role.³¹¹ It required citizens to provide advance notice to the government and alleged violators before filing suit to enable the government to preempt the citizens' action.³¹² Similarly, in some cases courts have held that a later-filed government action operates to render a citizen suit moot because the government action adequately addresses the alleged violations.³¹³ Thus, Congress established a gatekeeping regime that enables the government to monitor and, in some cases, displace, citizen suits.³¹⁴

The significant increase in accessible information that is a primary goal and feature of the Next Gen initiative will make it easier to launch citizen suits.³¹⁵ Although Congress likely did not anticipate this dramatic change in capacity, it will increase the importance of coordinating government and private enforcement, such as through EPA's exercise of its gatekeeping authority. EPA will need to be alert to issues that include over-deterrence, inconsistent treatment of similarly situated regulated parties, the use of theories and evidence in ways that might have unintended consequences for EPA's policy objectives, and citizens' exercise of their "private attorney general" authority to pursue their own private rather than public interests.³¹⁶

C. Dynamism, Environmental Enforcement, and Regulatory Redesign of Civil Society's Roles

The revolution in data availability that is central to Next Generation Compliance will significantly affect citizens' roles in each of the four contexts discussed above.³¹⁷ More data

enforcement, the knowledge that concerned citizens have the ability to enforce compliance serves as a deterrent for those entities contemplating violating the law. Thus, citizen suits encourage compliance with environmental statutes by both serving as an enforcement mechanism for past violations of the statute and as a deterrent against future violations."); *see also* Sarah L. Stafford, *Private Policing of Environmental Performance: Does It Further Public Goals?*, 39 B.C. ENVTL. AFF. L. REV. 73, 78 (2012) (noting that citizen suits can supplement limited government enforcement resources, "thereby increasing the level of deterrence associated with environmental violations").

³¹⁰ *See, e.g.*, 33 U.S.C. § 1365(d) (2012); 42 U.S.C. § 7604(d) (2012).

³¹¹ *Gwaltney v. Chesapeake Bay Found.*, 484 U.S. 49, 61 (1987) (characterizing intended citizens' roles as "interstitial," not "potentially intrusive"). A Senate Report stated that "[t]he Committee intends the great volume of enforcement actions [to] be brought by the State." *Id.* at 60 (citing S. REP. NO. 92-414, at 64 (1971), *reprinted in* 2A Legislative History of the Water Pollution Control Act Amendments of 1972, at 1482 (1973)).

³¹² *See, e.g.*, 33 U.S.C. § 1365(b) (2012); 42 U.S.C. § 7604(b) (2012).

³¹³ *Atlantic States Legal Found. v. Eastman Kodak Co.*, 933 F.2d 124, 128 (2nd Cir. 1991).

³¹⁴ For detailed consideration of agency gatekeeping of citizen suits, *see* Engstrom, *supra* note 15 (suggesting the importance of contextual features in design of such regimes).

³¹⁵ *See* Markell & Glicksman, *supra* note 19, at 74-75. This is not to downplay the evidentiary and other issues citizens are likely to face in seeking to rely on new types of data. *See, e.g.*, Zacaroli, *supra* note 66 (discussing the pros and cons for a company facing a citizen suit). Access to better information also may increase the viability of common law actions, particularly when monitoring data suggest material harm to individuals or the ambient environment.

³¹⁶ Markell & Glicksman, *supra* note 19, at 73-74.

³¹⁷ *See* Memo from Cynthia Giles, EPA Assistant Administrator, to EPA Regional Counsels, *Use of Next Generation Tools in Civil Enforcement Settlements* 3 (Jan. 7, 2015), <http://www2.epa.gov/sites/production/>

generated by regulated parties, and more data collected by citizens, will expand citizens' capacity to participate in EPA decision-making processes, including rulemakings, permit proceedings, and enforcement actions. It also will affect citizens' capacity to work directly with regulated parties through "good neighbor" and other arrangements; expand citizens' role as fire alarms alerting government to perceived concerns; and provide a basis for increased citizen suit activity.

Regardless of one's views of the normative implications of these significant changes in citizens' roles, process designers need to account for these consequences. In the context of the Next Gen initiative, it will be important for EPA to consider the likely implications of this rollout of dramatically increased data and improved communications technology for the roles that citizens may play. We have identified some of these implications to illustrate the type of analysis we regard as critical to process design that carefully considers both possible benefits and unintended consequences of such transformations in capacity, and of other aspects of a dynamic regulatory environment. Consideration of the impact of change on the desired role of citizen actors is particularly important when a goal of program redesign is to expand non-governmental organizations' roles, as is the case for EPA's ongoing initiative. In *Dynamic Governance, Part II*, we extend our conceptual framework to consider other key actors, and important mechanisms and tools.

VI. Conclusion

One of the many factors that complicates efforts to govern effectively is the dynamic character of many policy challenges and the opportunities to address them. This article demonstrates the dynamic character of a wide array of policy arenas, and suggests several sources of or reasons for such dynamism. Beyond arguing that those involved in policy design and implementation should account for this reality, the article offers a conceptual framework for doing so, notably that policy design needs to account for the full array of actors that have the potential to affect regulatory implementation, the range of mechanisms available to promote regulatory goals, and the tools available to the actors with the authority and capacity to use these mechanisms.

Our conceptual framework has value independently, but it also provides insights when viewed through a different lens that the rich literature on adaptive management offers for facilitating adaptability as circumstances change. For example, as we describe in Part IIE above, adaptive management is a decisionmaking methodology crafted specifically to deal with change. It is an iterative, structured approach that includes, among other steps, problem identification, establishment of management goals, selection and implementation of management actions, monitoring and evaluation of those actions, and cycling back to the first step for refinement in light of lessons learned.³¹⁸ Our framework suggests that, at each step, policymakers'

files/2015-01/documents/memo-nextgen-useinenfsettlements.pdf. Giles alluded to a hoped-for expansion of the first type of interaction in her 2015 memo. *Id.* ("Some [Next Gen] tools [will] allow individuals and communities that are impacted by a facility's environmental noncompliance to have real-time access to environmental information stemming from a settlement.").

³¹⁸ See *supra* notes 80-81 and accompanying text. For discussion of the value of *ex post*, "back-end" decisionmaking procedures for rulemaking and adjudication, see Robert L. Glicksman & Sidney A. Shapiro, *Improving Regulation Through Incremental Adjustment*, 52 KAN L. REV. 1179 (2004); Sidney A. Shapiro & Robert

consideration of the full range of possible actors and their roles, of possible legal and other mechanisms, and of tools is likely to enhance their ability to craft regulatory programs that allow each step to proceed in an optimal way, while minimizing regulatory and practical barriers to doing so. Other decisionmaking methodologies for responding to change are likely to present a different array of choices in light of the actors, mechanisms, and tools involved in their design and implementation.

We have used the specific context of regulatory enforcement to demonstrate the value of our conceptual framework because we are convinced that it offers a useful and revealing lens for policy design in a dynamic context. The opportunity to apply our framework in this context stems from EPA's determination that the dynamic circumstances it confronts require radical reform of its enforcement and compliance infrastructure, and its decision to establish a transformative enforcement and compliance "paradigm" in response to the shifting landscape it faces. The discussion above reviews the challenges facing EPA that have persuaded it of the need for a new approach, identifies the elements of the transformative effort on which EPA has embarked, and provides examples of the kinds of sophisticated regulatory design choices that our framework may illuminate.

We respectfully suggest that our conceptual framework may provide a helpful lens for considering regulatory design, including redesign of regulatory enforcement. The five elements that EPA has described as the centerpiece of Next Generation Compliance are a mix of what we suggest should be termed "mechanisms" and "tools," and we think it is important to consider them distinctly at a conceptual level. Two of EPA's five elements – "rules with compliance built in" and "innovative enforcement"³¹⁹ – refer to legal *mechanisms* available to EPA in implementing policy. In contrast, the other three – advanced monitoring, electronic reporting, and increased transparency – are *tools* to advance Next Generation Compliance that typically are put into use through a legal mechanism, including rulemaking, permitting, or enforcement. EPA's own materials acknowledge as much.³²⁰ This lack of conceptual clarity has the potential to cause an agency such as EPA to miss opportunities to advance its goals more effectively through a different mix of actors, mechanisms, and tools. Our discussion of the role of citizen actors in Part V illustrates why we believe that use of our framework is likely to aid in surfacing and addressing critical issues for today's complicated multi-level, multi-governance realities.

In a second article that serves as a companion piece to this one, we continue our exploration of the value of our three-part policy design framework, both generally and by applying it to EPA's new enforcement venture. In that article, we elaborate on the introductory discussion here on why our framework focuses attention on what we believe to be critical policy design questions: who are the key actors; what legal and other mechanisms might each actor use to advance a desired policy objective; and what tools (such as advanced monitoring in the EPA context) might be helpful in advancing that objective.³²¹ The application of the framework to

L. Glicksman, *The APA and the Back-End of Regulation: Procedures for Informal Adjudication*, 56 ADMIN. L. REV. 1159 (2004).

³¹⁹ See *supra* Part IVB.1, 5.

³²⁰ See, e.g., Giles, *supra* note 1, at 26 (citing use of rulemaking and /or enforcement to include advanced monitoring and other tools).

³²¹ The answers to each of those questions will vary depending on the context. See, e.g., Greg Mitchell, *Good Scholarly Intentions Do Not Guarantee Good Policy*, 95 VA. L. REV. IN BRIEF 109, 111 (2010) (arguing, in the

EPA's Next Generation Compliance Initiative illustrates how the three components of the framework relate to one another, and that both the mechanisms and tools available to implement a regulatory program interact with a variety of actors, both inside and outside government. This case study also demonstrates that, by focusing policymakers' attention on the challenges presented by a dynamic regulatory environment in a structured manner, our framework may help to spot significant issues that otherwise are not likely to receive sufficient attention as part of regulatory reform efforts, and thereby avoid missing important opportunities for successful reform.

context of anti-discrimination policy, that scholars must avoid oversimplifying complex problems because they may have context-dependent solutions). Our three dimensions are intended to be inclusive: actors can and often do work together; an agency may use more than one mechanism to advance a policy objective; and a mechanism may make use of more than one tool.